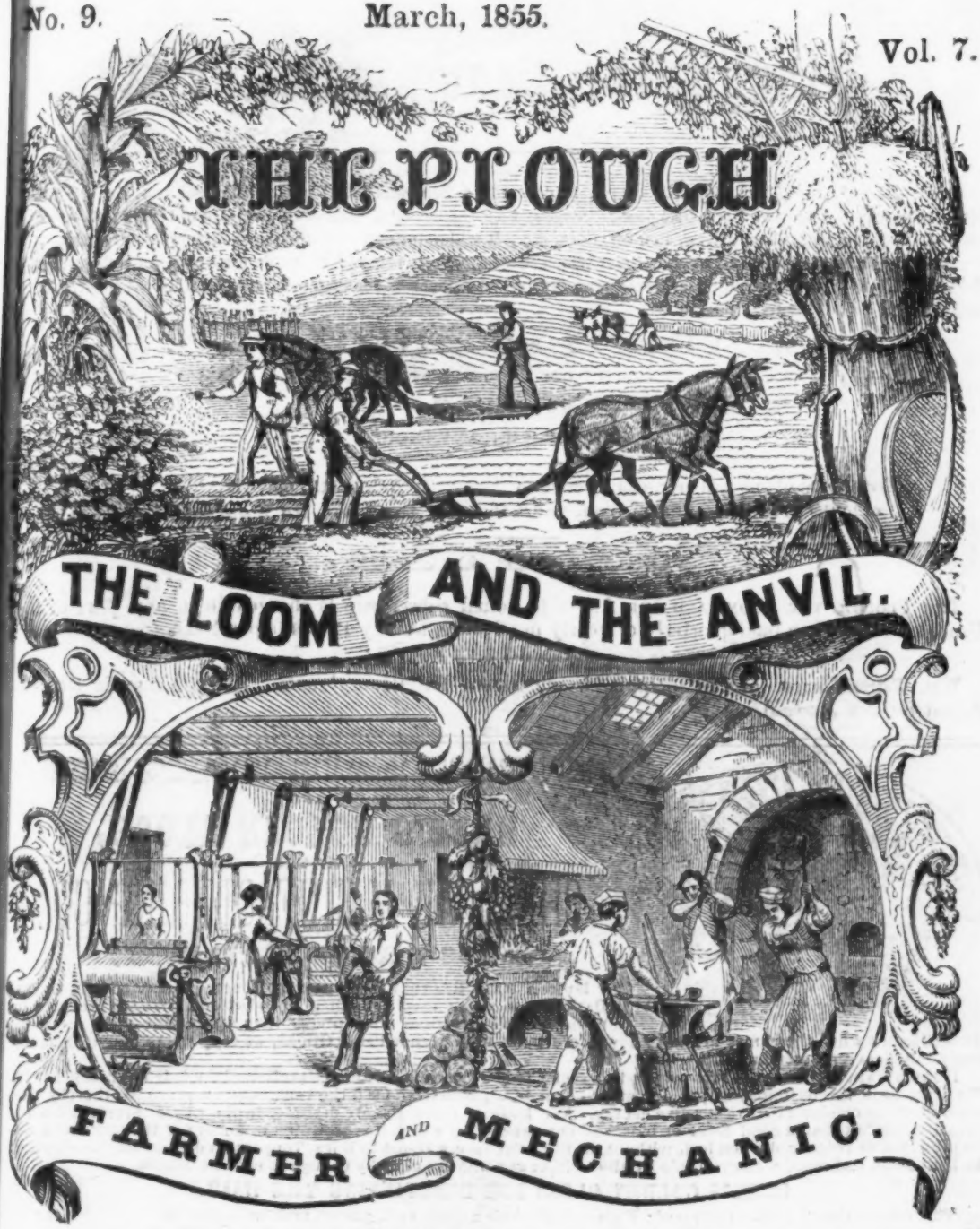
No. 9. March, 1855. Vol. 7.



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The Plough, the Loom, and the Anvil.

VOL. VII. MARCH, 1855. No. 9.

"COMMERCE IS KING"

So was Charles I., of England, and so is Francis Joseph, of Austria. There are kings who have but little power of their own, and that little they abuse. There are kings, who, distrustful of themselves, carry out the suggestions of wise counsellors, and they have far more credit for intelligence and energy than they really deserve. There are kings, whose crown is theirs of right, whether reference is had to descent or to personal desert. There are kings, whose authority is acknowledged with not a little of awe and reverence; and there are kings who are permitted to retain their title and their place because they do no harm, and allow every body to manage their own affairs.

Without regarding the particular sense of the phrase, when this "common saying," which we have taken for our title, is uttered by one and another of this or that nation, let us examine, in the light of facts, what is its TRUE sense. How, and why, and where, is commerce king? We could point to countries and to regions of less extent, where, in a mistaken sense, it is supposed that commerce reigns; and we could show too, that sometimes this reign is anything but just and kind. We could point out localities and times when her iron heel is upon the head of those under her authority, while they all live and breathe only as she nods a contemptous permission. But we can also point out the times and the places where she is as submissive and unpretending a servant as any Ethiop. She has no will but that of her subjects, and she ceases to labor only by their consent.

There are some phrases that seem to be chiselled into the very granite of our social structure that are very indefinite in their meaning. But this does not prevent their use on all occasions and for all purposes. They are heard either as sigh or song in every breeze; they are uttered in triumph or in dismay, as they encounter one or another class of the community. Perhaps what was commenced as a shout is echoed back in the note of despair. "Commerce is King" may be, by bare possibility, of this class.

This cry reminds us of a story told of more than one, but which describes an actual scene in the life of an eccentric divine, of Berkshire County, Mass. "In those days came John the—Episcopalian? No, that does not sound right. In those days came John the—Presbyterian? No, that is not it. In those days came John the—the Baptist? Ah, yes; 'John the Baptist.' So you see, my hearers, John was a Baptist." So "Commerce is King." But who is Commerce? What is this king? Is he a man? a ship? a class? a clan? Does he live on land or on the sea? Is his throne near by, or "afar

off?" Does he take cognizance of all, or only of the great? Who is he, and what is he?

Commerce, says Webster, (*we* go for Webster,) is—"1. An interchange or mutual change of goods, wares, productions, or property of every kind, between nations or individuals, either by barter or by purchase and sale; trade; traffic—foreign or inland. 2. Intercourse between individuals, interchange of work, business, civilities, or amusements; mutual dealings in common life." And Daniel Webster has spoken of "a vast *commerce of ideas.*"

Now in view of this definition, we confess ourself almost puzzled. We hardly know what to say next. The *thing*, the image, is almost as misty as the form described in Milton's first book; as formless as the spirit which we can scarcely seem to see in the 4th chapter of Job. Its limits pervade all space. Its motions are felt in every place. Its breath is heard wherever one proposes a trade with his neighbor. His voice sounds loud in the auction-room, in the market, and on 'change. Wherever men meet, and each recognizes the existence of the other, there is commerce. Surely then, there is at least one attribute of power. Commerce *may* be king. But look again.

In the strictest, technical sense, commerce embraces "all exchange of goods, wares, productions, or property of any kind." No proper definition of the term can be given less comprehensive than this. Commerce with foreign nations, trade on the sea, exchange of large values—these are no definitions of commerce. No sane man ever so believed. These are parts, branches, departments of commerce, nothing more. And as we dwell on the subject, we are more than half persuaded, in spite of all that farmers, mechanics, or trades or crafts of any sort, can say, that "commerce *is* king."

But what does the phrase mean? Who will tell us? Is any one and every one king, who *carries on* commerce? Such a claim would be like that of some anti-monarchists, which makes every citizen a monarch—a monarch without the title, and destitute of power. Is this the case with King Commerce? Poor King Commerce!

Perhaps we can come to some result by a series of negations. And it is very clear that these words can not imply that the individuals, or any limited combinations of persons *interested* in commerce, can make themselves kings. Commerce is king; and these caballers, these factionists, these conspirators against the existing sovereignty, have no crown, no thrones, no court, no paraphernalia of authority. The chair of state is occupied. What if each owns a score of ships, or daily sells 10,000 barrels of flour, or every hour sends a ship to a foreign port. They are not commerce, and *commerce is king;* and what is more, it is not in their power to dethrone him. Nor are the small or the large, nor all the people interested in commerce, in any city, state, country, or continent, identical with commerce. All that can be said is that they live by it.

How far shall we pursue these negations? Probably we have already blown away some of the fog which rests on many minds in regard to this great image. They perceive that those interested in a thing, must be essentially and utterly, and in every part and particle, different from the thing in which they have this interest, and by which they thrive. All the merchants, traders, dealers, sellers, buyers, barterers, &c., &c., in all the world, *are not* commerce. Whatever is true, therefore, it is not true that those who trade in any particular sorts of wares or merchandize, have the throne and reign, of right, over others. It does not follow that "a merchant" can therefore *look down* on "a farmer" or "a mechanic." He is no more "commerce"

than they, and perhaps we may see, by and by, that the balance is, if any where, the other way. If commerce is king, then "foreign commerce" is but a foot or a leg, it may be only a toe. Let us see what the facts are, bearing most directly on this subject.

1. The man engaged in foreign commerce has first to procure every thing that he puts into trade, from those of other pursuits. Not a kernel of corn, not a grain of wheat, not a seed of an apple, not a particle of anything, can he have, even *for himself*, till he procures it, by the aid of, or through commerce, of the producer. His name goes through all the commercial papers of the country, as having sent out so many hundred thousand dollars' worth of apples, pears, figs, oranges, and other fruits, such a value of spices, so much cotton, tobacco, &c., &c. Where did he get it? He had to buy every mill's worth of the producers, the growers, the farmers. They had it, he had none. Which position seems like that of a king here? But have we strained, or tortured, or misapplied the truth in this representation? Surely not.

2. The foreign trader may fail to purchase these articles. He will have nothing to do with them. What then? Must the producers starve? By no means. They will graduate the amount to be produced by the probable demand, but they will be pretty sure to raise enough for their own use, so that *they* are safe. But where is "our king," who sent these goods to foreign nations? He begs of those producers to let him have at least enough for his personal necessities. Who is most like a king then?

Is this declamation? Is it mere theory? Look at facts. Of all the commerce of the world, it is fairly estimated that, in 100 parts

Trade among neighbors forms, - - - - - -	75
Trade among fellow-citizens, but living more remotely from each other, - - - - - - -	20
Foreign trade, - - - - - - - - - -	5
	100

Which interest stands highest here? This is not theory, nor speculation, nor dogma, nor sect, nor party. It is the result of actual calculation. And perhaps many persons will be surprised to learn that if all our foreign commerce were annihilated, the entire amount of trade would be directly diminished only by five parts in a hundred. Ninety-five per cent. would still remain.

There is, however, another view of the subject, which changes, to some extent, the appearance of this picture. In its essence, it is unchangeable. The parts of it are fixed on the canvass beyond the power of art to change them. We can, however, materially improve the shading.

Instead of adopting Adam Smith's division of labor into productive and unproductive, we are inclined to consider all forms of industry (so called) as productive, and arrange different craftsmen into those who—1st, produce valuable material, and those who—2d, by a change of form or condition of the material, add something to its value. Thus, by the *labor* of the farmer, with a trifling cost of money, one bushel of grain, of trifling value, becomes many, worth a large sum. This is his business, and he has no time for any thing else. He attempts nothing else. The miller changes the form and condition of this grain, and thus making it available for use as food, increases to some extent its value. The baker does the same. They are producers of the second sort. The second form may, in some cases, be quite as productive

as the first. Such is the case with the watchmaker, for example. Suppose all these opportunities of useful industry are promptly and fully met, that territory then may be said to be supplied with all the population it can support. It can feed no more. But a new thought is suggested. There is a community "elsewhere," who, being otherwise occupied, do not produce this useful article of food; and it is ascertained that the producers, if they could but convey the material to that community, would find a ready market at a paying price. But who shall convey it? They have business enough in producing it, and can not endure this additional labor. They may find a third party, who will transport their merchandize for them, for a reasonable compensation. This third party is, then, the foreign merchant. The producer pays him for his services; they cultivate more land, secure greater crops, and also supply the third party with his food, as he has no opportunity to produce it for himself, and thus they again have an increased demand for the results of their labor. They call in help from abroad. Their sons, as they grow up, are all engaged in the same labor, and both the communities are thus increased; while the third party, the carrier, obtains a very important position. He is dependent on them for his daily bread. They are dependent on him for the profit that may be obtained from their *surplus* products. If he abandons them, they must limit their products to their own wants, *or become their own carriers;* and whether the one or the other would be the more profitable, would depend entirely on circumstances.

It is true, however, that producers generally can not be carriers. If they would get the profits of their increased production without help from others, they must induce the people to whom they have before conveyed their food, to change their location, and to come and reside in their neighborhood. When this is done, the only third party they will need is one of the younger boys, who will drive the team to the neighboring village, and there leave what has already been contracted for, or what will be called for as soon as it arrives. And here we have the value of immigration, not the immigration of rival producers, but of consumers; not of farmers, but of artisans and manufacturers.

But "commerce is king," although our commercial hero of the third party has abandoned the field, and is no more heard of. And how is "commerce" king? Evidently thus. All these arrangements are made with a view to increase the facilities of commerce. It is for this the *merchant carrier* was dispensed with. His employment, as a business by itself, was abandoned, for the very purpose of encouraging commerce. The interests of trade, that is, of commerce, are promoted thereby, though at the ruin of the foreign shipper, and thus COMMERCE IS KING. Another view of a kindred topic will be found in another page of this journal.

TREATMENT OF BOOTS AND SHOES WHEN BURNED.—In our juvenile days we had occasion, too often, to need a cure for carelessness in burning our boots, and we used to apply, with good effect, an application we have seen recently recommended in a late exchange. Apply, very liberally, and instantly, soft-soap to the burned leather, till it is perfectly saturated. If not too badly burned, the leather will be soft and pliable as before.

TO THAW PUMPS.—Procure a lead tube of convenient length to reach the ice; place the tube on the ice, and pour into it hot water, till the whole is melted.

IRON TRADE OF SWEDEN AND NORWAY.

BY H. SCRIVENOR.

SWEDEN has been long celebrated for its mines and mineral productions, particularly iron, which still forms one of the principal exports, although it has much decreased of late years. By an account taken by the government in the year 1748, we find that, at that time, there were 496 foundries, with 539 large hammers, and 971 small ones, for making bar and other manufactures of iron, which produced 304,415 ship-pounds*, or nearly 40,600 tons.

The government established an office in 1740 to promote the production of iron, by lending money on the ore, even at so low a rate as 4 per cent.; a correct register was then made of the mines, which is still continued. Each forge has its particular mark stamped on the bars of iron it produces, which is correctly copied into the manuscript, with the name of the place where the establishment is situated—the names of the proprietors of the work—the commissioner or agent for the sale of the iron—the assortment each makes, and to what country it is generally shipped—the quantity annually made by each work—the quantity which each work delivers to the goverment (which is about 1 per cent. on the quantity of the iron produced)—the estimation of the quality of the iron of each work, which is variable—the place and province in which the works are situated—the place from whence the iron is generally shipped, and how many hammers each work has: all which particulars are regularly and alphabetically described and arranged.

As the working of the mines is attended with considerable expense, and the sale of the iron uncertain, the Bank of Stockholm receives that metal as a proper security for a loan. The iron being duly appraised, and lodged in the public warehouse, the proprietor receives three-fourths of its value, at the interest of 3 per cent., and when he can find an opportunity to dispose of his iron, it is again delivered to him, on producing a certificate from the bank, that the loan upon it is duly discharged.

The iron mine of Dannemora, the most celebrated in Sweden, is situated in the province of Upland, about one English mile from Osterby, and thirty English miles north of Upsala. This mine was discovered in the year 1448, and though it has now been wrought for four centuries, it still yields abundance of the best iron in Europe.

The iron mine is on a hill so little elevated above the surface of the neighboring country as easily to escape observation. It is about two English miles long, and nearly half a mile broad; it is almost surrounded by lakes—those of Dannemora, Films, and Grufve, lying quite contiguous to it. On the side where there are no lakes there is a turf moss. The ore forms a large vein in this hill, which stretches in a north-west and south-east direction. The mine was some years ago inundated by the water from the adjacent lakes; a strong wall, however, has been built to keep off the water. It is drained by two steam engines, kept at work by means of wood for fuel.

It was first wrought as a silver mine, the silver being extracted from galena. This source of emolument soon failing, or becoming unproductive, the iron ore began to be extracted and smelted, and the excellent quality of the iron gradually drew to it the attention of the public. At first it belonged to the King of Sweden, but that monarch consigned it over to the Archbishop

* 7¼ to a ton.

of Upsala as a part of his revenues; at present it belongs to a number of private individuals, who work it separately, each on his own account.

At the side of the mine is a large opening, about fifty fathoms deep, and fifty wide, and at the lower part of this is the entrance to the mine, which is wrought about thirty fathoms deeper than this opening. The mines are thus described in "Coxe's Travels," who visited them in the year 1790:—"The pits are deep excavations, like gravel pits, and form so many abysses or gulfs. The descent is not, therefore, as is usual in mines, down a narrow, subterraneous shaft. At the side of the mine I stepped into a bucket, and, being suspended in the open air, in the same manner as if a person was placed in a bucket at the top of Salisbury spire, was gradually let down to the ground by a rope and pulley. The inspector accompanied me to the bottom, and while I was placed at my ease in the inside upon a chair, he seated himself on the rim of the bucket, with his legs extended to maintain the equilibrium. He had in his hand a stick, with which he gently touched the sides of the rock, and the rope of the ascending bucket, in order to prevent our bucket from swerving against them, which must have infallibly overset us.

While hung suspended in mid-air, and so giddy that I could not venture to look down, I observed three girls standing on the edge of the ascending bucket, knitting with as much unconcern as if they had been on *terra firma*; such is the effect of custom. We were about five minutes in descending, and the depth which we reached before I stepped out of my aërial seat was 500 feet. Not being a mineralogist, my curiosity was soon satisfied; I again got into the bucket, and was drawn up in the same manner.

The inspector informed me that the richest ore yields 70 per cent. of iron, the poorest 30; that, upon an average, the collective mass gives one-third of pure material; that about 12,000 tons are annually drawn from the mines, which yield about 4000 tons of bar-iron.

The mass of ore occupies a small compass. The length of the pits, considered as one, is 760 feet, and the breadth, from three to twelve. The ore runs from east to west. The richest ore is near 500 feet in depth, and the Storoe Grube is not yet fathomed.

The matrix of the ore being a calcareous earth, consequently contains but little sulphur, which is, perhaps, the reason of its superior quality."

The ore is blasted with gunpowder. The part of the vein which lies under the great opening which forms the mouth of the mine, is called *stor rymning*; it constitutes by far the greatest portion of the mine. The next portion is called *jord grufva* (earth mine), and it yields the ore of the very best quality. The portion farthest south is called *sodra grufva*, or southern mine; it yields the worst kind of ore of all the three, probably from being mixed with galena and blende. The rock through which the vein runs is said to be quartz. The substance immediately contiguous to the vein appeared to Dr. Thomson to be hornstone, and to contain hornblende. The ore itself contains limestone, quartz, and actinolite, and affords from 25 to 75 per cent. of cast-iron. In the worst kind of ore Dr. Thomson also perceived blende, fluor-spar, galena, and amethyst, but in small quantities. Carbonate of lime, crystallized in dodecahedrons, also occurs in this vein; and likewise sulphate of barytes, mountain cork, and the aplome of Haüy.

The ore is broken into small pieces, and roasted; it is then put into conical shaped furnaces, constructed of the slag from cast-iron. In these furnaces it is mixed with the proper quantity of charcoal, and then melted and separated from the slag. The cast-iron obtained in this manner is as white as

silver, completely crystallized, and very brittle. The cast-iron is reduced to malleable iron by heating it in a bed of charcoal, and hammering it out into bars. In this state it is whiter than common iron, and is less liable to rust, is distinctly fibrous in its texture, and much stouter than any other iron.

The cause of the superiority of the Dannemora iron has never been explained. Some chemists ascribe it to the presence of manganese. Berzelius attributed it to the presence of the metal of silica, while others suppose it to arise from the nature of the process employed. Dr. Thomson was assured by one gentleman, who had bestowed particular attention to the subject, that, by following a similar process, he has obtained as good iron from other Swedish ores. But that something is due to the ore itself is evident from the circumstance, that the quality of the iron, though the same process is followed, differs a good deal, according to the part of the vein from which the ore is taken.

In the neighborhood of the mines are establishments for forging the iron, and for the accommodation of more than 300 workmen and their families. Each of the little villages has three or four regular streets, often planted with trees, a church, a school, and a hospital.

In 1833 there were in the whole of Sweden from 330 to 340 smelting furnaces, producing 90,000 to 95,000 tons of pig-iron; in converting this into bar-iron, about 23 per cent. is allowed for waste, and, as near as can be ascertained, the annual manufacture of this latter is 63,000 to 65,000 tons. The number of iron works is about 420 to 430, having about 1100 forge-hammers. The annual export of bar-iron, on an average of ten years, ending 1831, was 49,568 tons. The smelting furnaces and iron works are licensed for a particular quantity, some being as low as 50 tons, others as high as 400 to 500 tons per annum; some few bar-iron works draw licenses for 1000 tons each. The licenses are granted by the College of Mines, which has a control over all iron works and mining operations. The iron-masters make annual returns of their manufacture, which must not exceed their privilege, on pain of the overplus being confiscated, and the college has subordinate courts, called courts of mines, in every district, with supervising officers of various ranks; and no iron can be sent to any port of shipment without being landed at the public weigh-house, the superintendent of which is also a delegate of the college, and his duty is to register all that arrives, and to send his report quarterly to the college. It is impossible for an iron-master to send to market more than his license. Many, however, sell at the forges to inland consumers, returns of which are never made, and so far licenses are exceeded, but it is supposed this excess cannot be above 3000 tons.

There is no chance whatever of the manufacture of iron in Sweden becoming free; on the contrary, there is much greater probability of its decrease; as in those parts of the country where iron works are established, there are already as many forges as the neighboring forests can supply with charcoal. If there are proprietors of forests on which they can prove that iron works have not been privileged in former times, in that case the Government can not refuse to grant the right of erecting works in proportion thereto; but, except either very far north, or far in the interior, there do not exist such woods.

It does not always follow that the forests belong to the proprietors of the iron works, but they have, nevertheless, the right of purchasing all the charcoal sold from these woods. We may consider the case in this manner:— A person, a century back, who had 20,000 acres of forest, may have ob-

tained the privilege of manufacturing 200 tons of iron annually; the estate in the lapse of time has become divided amongst a number of heirs, or has been sold in lots to different persons; but the proprietor of the iron works still retains the right to the charcoal of the whole, if any is made for sale.

There is no department in Sweden conducted with more fairness than the College of Mines, which manages these matters.*

Years.	Average Produce. Unwrought Iron. Tons.	Bar-Iron. Tons.	Average Exports. Bar-Iron. Tons.
1833 to 1839	89,610	73,592	58,766
1840 — 1844	105,485	84,041	66,046
1845 — 1849	106,630	90,466	74,069
1850 — 1852	124,169	99,889	75,940

Important recent discoveries have had, and necessarily will have, a material effect on the iron manufacture of Sweden. Dr. Ure may introduce the subject to our readers in the following observations respecting Mr. Heath's experiments in the manufacture of *steel* and their results:

"One of the greatest improvements which this valuable modification of iron has ever received is due to Mr. Josiah M. Heath, who, after many elaborate and costly researches upon both the small and the great scale, discovered that, by the introduction of a small portion (1 per cent., and even less) of carburet of manganese into the melting-pot, along with the usual broken bars of blistered steel, a cast-steel was obtained after fusion, of a quality very superior to what the bar-steel would have yielded without the manganese, and, moreover, possessed of the new and peculiar property of being weldable, either to itself or to wrought iron.

He also found that a common bar-steel, made from an inferior mark or quality of Swedish or Russian iron, would, when so treated, produce an excellent cast-steel. One immediate consequence of this discovery has been the reduction of the price of good steel in the Sheffield market by from 30 to 40 per cent., and likewise the manufacture of table-knives of cast-steel with iron tangs welded to them; whereas, till Mr. Heath's invention, table-knives were necessarily made of shear-steel, with unseemly wavy lines in them, because cast-steel could not be welded to the tangs."

Mr. Heath obtained a patent for this and other kindred meritorious inventions, on the 5th April, 1839, "but, strange and melancholy to say," observes Dr. Ure, "he has never derived anything from his acknowledged improvement but vexation and loss, in consequence of a numerous body of Sheffield steel manufacturers having banded together to pirate his patent, and to baffle him in our complex law courts." Whether the remarks on the conduct of the steel manufacturers of Sheffield are just, is not important to this inquiry; the fact is, that various alterations and improvements have been effected in the manufacture, not confining it to the use of Swedish or Russian inferior marks, but to the use of English iron, and this to the extent of attracting the notice of Mr. C. F. Wœrn, Junior, a member of the Swedish Diet, who made it the subject of a motion in the Diet, 1853, 1854:—"On the repeal of the taxes on pig and bar-iron, as well as of the privileges still existing in favor of the mining districts and iron works of Sweden."

* In several parts of Lapland, the protoxide of iron occurs in great beds, or immense masses; at Gillivara, 200 leagues north of Stockholm, towards the 67th degree of latitude, it constitutes a considerable mountain. The iron is despatched in small sledges drawn by reindeer, to streams which fall into the Lutea, and thence, by water carriage, to the port of Lutea, where it is embarked for Stockholm.

Mr. Wœrn, in his Treatise—after a review of the iron trade in Sweden during the last twenty years, and arriving at the conclusion that the home consumption has certainly been on the increase, owing to the general growth of population and trade between the years 1834 and 1851—says: "Yet, in comparison to the population, the consumption per man is very much smaller than in other civilized countries; accurate calculations on this subject show the following results—all kinds of iron being reduced into pig-iron:

In North America the consumption is . .	88 lbs.	per head.
Great Britain, ...	81	"
France, ...	36	"
Hanover and Oldenburg, ...	29	"
German Customs' Union, ...	24	"
Switzerland, -	18	"
Sweden, ...	11½	"
Austria, ...	11	"
Russia, ...	8	"

At present there is reason to believe that the Swedish consumption is 14 lbs. per head."

He then speaks of the exports of bar and manufactured iron from Sweden, which, during the same period, he calculates to have increased about 25 per cent.

In order to show the insignificance of this increase, in comparison to that which has taken place in other countries, he reviews the trade, and speaks more particularly of the discoveries and improvements made from 1796 to 1851 in Scotland, and observes: "Instead of having been, as before these discoveries and improvements were made, only two-fifths of the Swedish production, it rose in Scotland in ten years to double the Swedish production, and is now six times as large. In Wales we notice the same thing, as well as in the United States, Belgium, Silesia, the German provinces on the Rhine, and even France. If we compare the countries which chiefly produce iron for the last twenty years, we find that

Great Britain . .	increased in	1850	244	per cent.
United States . .	"	"	471	"
France . . .	"	1846*	141	"
Russia	"	1849—1851	20	"
German Customs' Union	"	1850	60	"
Austria	"	"	130	"
Belgium . . .	"	"	217	"
Sweden	"	"	51	"
Norway . . .	"	1841—1845	62	"

and thus the production has increased more rapidly in every country than in Sweden, with the single exception of Russia. Now, if we compare the total production of these countries twenty years ago, and that of Sweden at the same time, with what it is now, we find that the production of this country has suffered a decrease from $\frac{1}{16}$ to $\frac{1}{32}$."

He then goes on to the more important subject of the manufacture of English steel. He says: "I have found it impossible to obtain trustworthy information as to the amount of manufacture or consumption of English steel

* Mr. Wœrn states the make of pig-iron in France, in 1846, as 2,742,51 ship-lbs. T. v., equal to 457,087 tons.

iron; but to a certain extent such a guide is found in the number of steel furnaces in Sheffield and the neighborhood. I have had returns made at four different periods. The first, of 1835, is found in Porter's 'Progress of the Nation;' the second, of 1842, is given by Professor Le Play, in his excellent treatise on the manufacture of steel in Yorkshire; the third is of the year 1846, and is part of the evidence of one of the largest manufacturers of Sheffield, Mr. Henry Unwin, before a Committee of the House of Commons, on the occasion of a railway being applied for to Sheffield; and the fourth is the result of an account taken at my request by the same gentleman, in July, this year, of existing furnaces, in which he says he is so much the more sure of not having overstated the case, as he has separately noted the owner and situation of each furnace.

According to these statements, there existed, in Sheffield and the immediate neighborhood, in

1835,	56	blistered-steel furnaces, and		554	cast-steel furnaces.
1842,	97	"	"	774	"
1846,	105	"	"	974	"
1853,	160	"	"	1,495	"

The new furnaces are built rather larger than the old ones, and Mr. Unwin estimates their capacity of production at 300 tons annually, and the total production of steel in England at 40,000 tons.

Porter estimates the manufacture of steel in Sheffield in 1835 at 15,000 tons, of which 2,000 tons were from English iron. The same amount is given by Mr. Danielson, in his Treatise on the Manufacture of Steel in England in 1844. Mr. G. Ekman, in his letter which refers to Professor Le Play's work, estimates this production of 1845 at 3,000 tons; and, according to Mr. Unwin's statement, giving 40,000 tons as the annual production of steel in England, it must now amount to 7,200 tons, when the whole import of foreign iron not re-exported has been deducted. *The English steel-iron is, moreover, universally known for its closeness and pureness, and some of the best sorts are so much liked, that they fetch a higher price than the best Swedish marks.*"

Thus much as to the competition of British iron with Swedish, in Great Britain, for the manufacture of steel. He then refers to the export to other countries, and shows that of Great Britain to be five or six times as large as it was, whilst that of Sweden has been almost stationary,—"that the latter amounted to almost one-half of the export of Great Britain twenty years ago, and in 1850 it was scarcely a tenth part of it, and must since then have fallen off still more."

The object of Mr. Wœrn's motion was to alleviate, if possible, this state of affairs, by inducing the Government to remove all taxes and restrictions on the manufacture of iron. But the greatest difficulty Sweden has to contend against, as far as the increase of manufacture is concerned, is *the want of coal.*

Now comes a consideration, whether, with the immense abundance of rich ore which Sweden possesses, there are not certain localities where it may be shipped at a low rate of cost. Let the Swedish Government take off any heavy restrictions on the export of this ore, and a valuable trade may be encouraged between Gottenberg, or other shipping ports, and the port of Newcastle, thus bringing the ore to the coal, and a more certain benefit might be derived by Sweden than by an attempt at any great increase of the manufacture.

Oddy, in his work on "European Commerce," observes, that iron makes

no regular article of export from Norway; yet there does not appear any reason why they might not have cultivated this branch of manufactures as well as Sweden. Wood they have in sufficient abundance. There are several foundries in Norway, but they have not been worked with spirit; their produce is, therefore, but small. Since the year 1792 they have not much extended their works. Moss, a town of a thousand inhabitants, contains a principal iron work. Skaggerak is also in repute for its iron trade.

The iron mines of Norway lie on the coasts of the Gulf of Christiana, and on the side facing Jutland, principally at Arendal, at Krageroe, and the neighborhood. The ores consist almost solely of black oxide of iron, which forms beds in veins of from 4 to 60 feet thick, incased in gneiss. These iron ores are reduced in a great many smelting forges situated on the same coast, and particularly in the county of Laurwig. The annual product is about 7,300 tons, in the form of cast-iron, bar-iron, sheet-iron, nails, etc., of which one-half is exported.

AVERAGE MAKE OF BAR-IRON.

Years.	Tons.
1831 to 1835, ...	3,645.
1836 — 1840, ...	3,898.
1841 — 1845, ...	3,772.

Average export, about 2,050 tons.

FROM HUNT'S MERCHANT'S MAGAZINE.

THE WINE TRADE OF FRANCE.

LETTER FROM DR. GOODRICH, U. S. CONSUL AT LYONS.

I propose to give you, in this communication, some account of the staple productions of France, that may be of interest to many of the readers of the *Merchant's Magazine,* and especially so, as the vine culture is beginning to attract attention in the Southern and South-western sections of our own country.

As you are aware, the two principal products of France are wheat and wine—both entering largely into domestic consumption, and the latter yielding a surplus for exportation.

The most productive wine districts of France are the South and South-western, and the least productive is the North-western. The vine grows not only on the level and undulating lands, but also on the hill-sides and mountain summits. These lands are mostly stony, sandy, sterile, worn out, and unfit for wheat growing. During the last three or four years a destructive disease has attacked the vine not only in France, but in Italy, Spain, and Portugal. This malady is of a fungoid character, and its preventive or remedy has hitherto eluded the vigilance and researches of the chemist and naturalist.

In the statistics I shall give you—and they will be official—I will, for brevity, avoid the smallest numerals, as my object can be attained without them. The number of acres of land under vine culture in France differs but a little from 5,000,000. There are about 2,000,000 of persons (mostly females) employed in the cultivation of the vine and the manufacture of wine, exclusive of 250,000 engaged in the transportation and sale of wines.

The average annual product is a little more than 800,000,000 gallons—for obvious reasons I give you American rather than French terms. The domestic or home value varies of course with the supply and demand, say from ten to twenty cents a gallon. For the last two years, owing to the "disease," the price has augmented from one to two hundred per cent. on former prices. The annual value may be set down in round numbers at $100,000,000.

In the year 1849, which is probably the best for several years, the number of acres under cultivation was 5,500,000, producing 925,000,000 gallons of wine. This was an increase of 115,000,000 over that of the last decade, 1839. Nearly 50,000,000 gallons are annually exported as French wines. In 1849, 41,000,000 were exported; in 1850, 42,000,000; in 1851, 49,500,000; in 1852, 53,200,000; in 1853, 43,500,000. Ninety millions of gallons are annually distilled into brandy, although for the ensuing year, owing to governmental restrictions, there will be but little French brandy exported to the United States except that made from American whiskey imported into France. One-seventh, or about 133,000,000 gallons of wine, are annually exported from France, either as wine or its distillations. The excise duty on wine and its productions paid into the French Exchequer during the past year was $22,800,000. This includes the ordinary excise, as also the "Octroi" or city duty. There are, by estimate, 220,000,000 gallons of wine manufactured into spirits, inclusive of the 90,000,000 made into brandy. This leaves more than 700,000,000 gallons of wine for home consumption, or about 21 gallons for each inhabitant for the year.

Wine, as a beverage, is universally used here by all classes. The strong liquors are chiefly for exportation; hence, you see very little drunkenness in *la belle France.*

The disease of the vine in France has for the last two years been very destructive, and it has greatly diminished the production of wine. This is on the increase, and fears are entertained that it may totally destroy the vine. Under this apprehension, may not the subject of vine culture legitimately and appropriately attract the attention of our Southern and South-western planters? Many of our Southern lands, I opine, are peculiarly adapted to the vine, and from natural sterility or other causes are unsuited to products requiring richer and stronger soils. The lands of southern Europe employed by the vine are light and sterile, unsuited to wheat and other grains.

If our Southern farmers would, at this time more especially, turn their attention to this subject, would it not enure to their own individual interests, enhance the national wealth, and be promotive of national temperance by the introduction into general use of a cheap beverage, that would ultimately root out those "villainous spirits," whose baneful influence is felt throughout the length and breadth of our land?

In regard to the vine and its diseases in Europe, should the present condition of things continue for a few years, would it be the strangest fact in the history of commerce, if our favored country should become the exporter instead of the importer of wine? and may not the vine yet prove one of the sources of our national wealth, as well as the promoter of a sound national morality?

Such a result would restore the vine to its pristine value, as one of the good gifts of God. Yours, &c.,

CHARLES S. GOODRICH.

Lyons, France, September 1, 1854.

FARMERS' SALES AND CITY PRICES.

If some of our domestic animals knew their own strength, they might forever free themselves from the state of servitude in which they are now held. Like the lion and tiger, they might be their own masters, but they would, at the same time, assume the responsibility of providing for themselves, and, on the whole, the exchange might not be an improvement in their condition. Our farmers, however, year after year, live in voluntary bondage to an army of greedy bloodsuckers, who draw out of them, at beggarly prices, the hard earnings of the labor of months, while they remain ever doomed to constant toil, and must themselves incur the risk of droughts, and of floods, and of overstocked markets, and of blighted crops, with no one bound to give them food or shelter for a single day. And this bondage is the result, to a great extent, of their own inefficiency and indolent habits. They scarcely feel their chains, or if they do, they have no idea that they can possibly be shaken off.

How is this? A complex, expensive, and artificial system is called into being, having in special charge the interests of the producer, who is taxed therefor from sixty to ninety per cent. of his possible profits. This system is composed of carriers, brokers, commission agents, and men of various other sorts, who make their entire living out of the profits on the products of the farm, actually paid by the consumer. That consumers do pay cruelly high prices under this system is a matter of actual experience. That farmers, at the same time, obtain little or no advance over the prices of years gone by, is equally a matter of experience.

What would our farmers think of receiving from 18 to 25 cents for their beef? What castles would they not build, in imagination at least, if they should realize eight or ten shillings a pair for their chickens, and three shillings a dozen for their eggs? prices paid every day in this market. They now sell their chickens at three or four shilllings a pair, oftener the smaller of these prices; their eggs at twenty or twenty-five cents a dozen, paid in groceries; and so on through the chapter. Some services are required, we are aware, before the living animal is prepared for the operations of the cook. But we remember when the hide, tallow, and offal, paid the butcher for his services, and suppose this would not be thought unworthy of the craft in these later times; and as to poultry, eggs, and the products of the dairy in general, there is no occasion for extra services, requiring compensation, to fit them for the stalls and shops of the retailer.

The difference between eight and ten cents a pound for pork is by no means slight in the matter of profit; twenty per cent. does not tell half the story. Probably the pork itself cost six cents. All the farmer's profit, then, (save the manure,) is two cents, at the lower price, but is four cents at the the higher; and this increase from eight to ten cents, makes a difference in the gain of exactly ONE HUNDRED per cent. If they could get but ten cents a pound, selling directly to the consumer, and sell for eight cents to the middle man, then they pay him just half their entire profits. Wall street men could not afford to pay for services at that rate.

Every thing that the farmer produces, with very few exceptions, is subject to the expense of a burdensome and complicated system. His butter and eggs often go to the village grocer, in payment for goods at the highest rates,

which goods are often and usually of an inferior quality, and for a sum varying from one-half to three-fourths their fair price in the market. Milk is sold to the cartmen, in a pure state, for about one-half (often less) of what it brings in the city, after it is nearly or quite doubled in quantity by the addition of the Croton, to say nothing of the chalk mixtures—and so runs the whole story. The poor farmer toils on, overjoyed to get six or eight per cent. on his investment, but, in a majority of cases, doomed to drag on from year to year, subjecting his farm (for want of means) to a wretched system of management, which is annually destroying its ability to produce—glad if he can feed and clothe a family, every member of which toils, not like a slave, but harder than he, while even his children can scarcely be spared to go to school, even in winter. And all this for what? Because the lazy earth will not produce what she ought? NO!! But, because farmers have no means to feed her. She is feeble as old age itself. They are, year by year, trying out, as by fire, the fat of the land, and the poor thing shows signs of decay, not to be mistaken. And all this, while middle men, out of the same products of the farm, are building splendid city mansions, and living on the luxuries of the season, paid for, all of them, from the crops produced by these poor farmers.

Horrible as is this picture, we thank God that we can perceive no difficulty in producing an entire change in this system, if farmers shall so will it, so that the profits that are made shall go into the pockets of those to whom they properly belong—to wit, of the producers. And how can this be done?

To some extent, the way is clear, and without any hindrance. Time might be required for perfecting the details of this important reform, but the following are self-evident propositions.

So far as the large establishments of hotels and boarding-houses, in all our cities and villages, are concerned, every man, who may be relied upon for keeping his contract, might engage an almost indefinite amount of eggs, milk, meats, his vegetables, and, if a good dairyman, his butter and cheese, at prices much higher than are now received by first hands, though, perhaps, not quite so high as the consumers now pay. Our milk farms are scarcely among the most profitable sources of income, while commissions or charges, of some sort, are paid to two or three middle men, who get a large part of their income, perhaps the whole of it, from the profits which might be secured to the producer.

Suppose the Astor House requires fifty gallons of milk, at regular periods. Let an arrangement be made by which that quantity of milk, properly secured, shall be sent by cars, or otherwise, at the times agreed upon. The hotel keeper sends his porter, on its arrival, and takes possession, returning the cans at the same time. How simple is this machinery. If the hotel or boarding-house keeper does not wish the trouble of sending for it, let him pay one cent per gallon additional, or half that, according to circumstances, while you engage a faithful porter to do this service at your cost.

The same arrangement is practicable with eggs, and most of the productions of the farm, including vegetables and perishable fruits. All that is required to accomplish this is ENTERPRISE, and a good article. Nor would these establishments require a very limited supply. Hundreds, even thousands, of contractors for the whole products of a farm, so far as several of these articles are concerned, might be found, at once, in this city. Other cities would furnish customers in proportion to their size; and, by degrees, a general system, relieved chiefly, if not entirely, of high-priced middle men, might be put in operation, for the sale of all the varieties of products required

for our tables, and with very little trouble to any body. But if it were otherwise; if the labor were considerable, still that labor would have its reward, and that is just what an active, efficient farmer would desire—an increase of his labor, without an increase of required capital, which would bring with it a proportional increase of profit.

We could refer producers to moderate sized boarding-houses—say families of twelve to twenty persons, who would rejoice to make such an arrangement. We have heard them express views in accordance with these suggestions, and we have also known such plans in successful operation.

Nor would this be a small affair to the farming interest. At present rates, probably, it would quadruple their profits; and, at ordinary prices, it would more than double them. The farmer who now gets six or eight cents for his pork, makes but a very small profit. Three or four cents increase on each pound would be a very great gain. If he could himself receive twenty-five and twenty-eight cents a pound, in cash, for his butter, which the speculator now gets, he would, ere long, have money in the bank, after paying off his mortgage, and buying improved stock. Twenty-five cents a gallon for milk and water, even though it was only half-and-half, would enable him, if he choose, to keep his pleasure carriage and fast horses; and more than this does many an unscrupulous city cheat get every day of the year, for a meaner article, to say nothing of another large amount for chalk mixture, intended, more particularly, for the poorer classes, who are obliged to buy where they can.

This whole system of middle men grows, to a very great degree, out of the indolence and inefficiency of the producer. Do we not hear it said in reply, "the farmer does not wish to become a carrier, nor a porter, dancing attendance at the doors of city aristocrats." Very well; then let him be content with his two to four per cent. profits on his most productive articles, while his active and less conceited city neighbor takes these, his hard earnings, and, by performing such services, pockets an additional twenty to fifty per cent., and, by-and-by, becomes himself the city aristocrat. But why should not the farmer do this service? Is it less honorable to contract with another for the sale of an article, delivery included, than it is to plough, and hoe, and ditch, and make compost, in producing? Is it less honorable for him to sell and deliver, than it is for our dealers in dry goods? Very few, we trust, will raise such objections. But they "do not want the increase of care and attention such a plan would demand." In reply to this, we say, if an increase of care is to be thus rejected, whatever it might return by way of profit, then it would be better to sell half the farm, and thus, by confining the labor of production to a few acres, and realizing from their products a larger sum than is now obtained from the whole, and, with less care, secure a greater income with less outlay. The value of this other half might then be vested in safe and remunerative stocks.

Commercial agencies are very good things when they are wanted; but they are, generally, death to the producer. Their incomes, kept out of their pockets by their own consent, and with their eyes wide open, and without the use of chloroform, have built many a princely mansion in this and other cities, and furnished their tables with all the luxuries of the season, while the producer, who might have reaped this golden harvest, is shivering in a cold kitchen, and sits at a table supplied with the less desirable products of his own hog stye, toughened and possibly made unwholesome by saturation with salt, and not merely villainous, but poisonous salt petre. WHO SITS FOR THIS PICTURE?

MILK IN BREAD.

We are sometimes forced to confess ourselves deficient in patience, when we read some of the deliberate assertions of scientific men. They pronounce, as from the seat of power, and the centre of all the wisdom, in favor of this, and that, and the other, in the very teeth of a general and almost universal experience. We are compelled to place a very few of the solemn announcements, even of the great Liebig, in this category. He has proclaimed that bread is rendered unhealthy by being moistened with milk, and though we cannot at this moment cite his words, there is no doubt that he intends to teach this doctrine. Many of our journals have copied his language, and also the following, without comment, which we regard as, at least, a partial sanction of it:

> Milk in Bread.—I have more objections than one to milk in bread, but the most serious is, that persons of advanced age, who are in the daily use of milk-made bread, will be expected to suffer from an over supply of osseous or bony matter, and particularly if their kidneys are affected. Bread should always be made with water, and when so made it is suitable for the aged and the young, the sick and the well. And as for sour milk, a microscopic view would, I presume, present additional arguments against its use.—*Water Cure Journal.*

Now, whatever may be said on this wise, we can not hesitate to pronounce the principle here inculcated, as a general proposition, in our opinion, utterly at variance with truth. We doubt not that there are persons, of all ages, who can not digest milk, even when diluted. We have seen infants in that condition. We are well acquainted with a very learned divine, who acquired an ability to indulge in the use of milk, in his maturer years, only by first diluting it very freely with water—perhaps nine parts water to one of milk. We have no doubt that these writers, to whom we refer, have met with such cases. But to pronounce that milk, in itself, is an unwholesome beverage, or a substance that demands of rational men, not moderation, but abstinence, is too ridiculous. What does the milk do to us, whether mingled in bread or otherwise, to make us dread it? Does it makes us too "bony?" We, who were brought up in the country, and who have used milk as drink, and in bread, and in various modes besides, shall not easily be led to admit that doctrine. We know of many more people who are apparently injured by meats than by milk, in bread or out of it; and our friend of the "Water Cure" is consistent in this, and forbids both.

Viewed in the light of "dietetics," why should milk in bread be unwholesome? Is it of doubtful expediency as a beverage? Who says that? And how is its nature changed when mingled in the bread? As a chemist, we venture to say, in nothing essential. Fermentation, when carried to excess, may affect portions of the milk, but it is not then unwholesome. Ask our Southern friends what they think of sour milk, of *bonny-clapper*. Why not eat bread moistened with milk before baking, as well as after? Is not bread and milk wholesome? Does "bread and milk" cause us to suffer from an "over-supply of osseous, or bony matter?" We have no patience with such science. "A microscopic view would, I presume, present additional arguments against its use." Indeed! And how is it with water? Does not a microscopic" view of that, too, "present arguments against *its* use?" We venture the opinion, that very few can view a drop of water before a solar microscope, and straightway go away and drink it. And how does a "microscopic view" affect the wholesomeness of vinegar? Friend *Water Cure*, vegetarian as you are, your logic is surely out of joint; for no one, of

any considerable experience in the use of optical instruments, can be ignorant that a microscopic view of vegetables would present millions and billions of "arguments against (their) use;" and nice, large, and plump ones, too. We doubt whether you will make much on either of these tacks.

We have lived for years on milk-bread, and wish those glorious days might return. And we are not very bony, nor troubled with the *animalcules*, so far as we know. Some of our family connexions have continued to live in the same style ever since, and they are not particularly bony. And when we visit "the spot where we were born," or its neighborhood, we always go back to these old habits, and eat our bread and milk, and milk-bread and milk, too; and we generally come back with less *apparent* symtoms of *too much bone* than we had before. We exhort our readers, one and all, who are not already diseased, or in an ab-normal state, to get and eat as much milk-bread as they can.

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

SANDY SOILS—LONG ISLAND.

MESSRS. EDITORS: I was pleased to notice, in your last number, an article over the signature of "L," calling the attention of your readers to Long Island and its neglected soil. It is truly remarkable that the lands of Long Island, so cheap, and so close to New-York, the best market in the world, have been suffered so long to lay waste and unproductive.

The chief causes, no doubt, are, that immense tracts have belonged to single families or individuals, and that cutting wood, catching oysters and fish, instead of farming, have long been the principal occupation of the inhabitants; and, at the same time, there has prevailed a mistaken opinion as the quality of the land and its fitness for agricultural purposes.

A gentleman of Islip informed me, not long since, that he had resided forty years upon a farm on the south side, which was very productive; but that the great body of the land, in the middle of the Island and along the railroad, was, until recently, considered worthless; but that he had put some under cultivation near Suffolk Station, and was surprised at the result; and from experience he found it superior to the old farm.

There is a very erroneous opinion generally entertained about porous soils losing the manure by percolation. A recent examination, by a gentleman of Long Island, of a barn-yard where the soul was porous, showed that the discoloration of the soil, underneath the barn-yard, had not extended but a little depth; and his opinion was that he lost but little of the strength of the manure by percolation.

It is a well known property of water, in passing through the earth, to part with all foreign matter held by it. Witness the purity of the springs on sandy or gravelly soil, and the operation of artificial filters, as seen on a small scale about our cities, and on a large scale in the water-works of London and other European cities. Is it not a popular error that the manures are lost by percolation?

May there not also be an error about the loss of manures by evaporation, when covered in the soil? Evaporation carries off the moisture, it is true; converts the water into steam, but how can anything except moisture leave the soil? If you evaporate salt water the salt is left; if sweet water—sap of the maple or juice of the cane—sugar is left.

There are some well known facts that bear on this subject. One is, that in very dry seasons porous soils suffer less than the close and clayey soils. This was the case on Long Island last year, which was a very dry one. Long Island suffered less than almost any other section of the country where the drought prevailed equally.

The sandy soil allows early ploughing and sowing, and if thus worked and properly manured the vegetation of the crop covers the soil before the sun renders the surface too dry. The air penetrates the open, porous soil, and at night deposits its moisture, with which on Long Island it comes richly laden from the ocean or the Sound.

I will venture to predict that Long Island is destined at no distant day to be a remarkably rich and productive agricultural country; or rather, that it will be one immense and teeming garden.

W. E. M.

NOTE.—Our correspondent is no doubt correct in his opinions above expressed in relation to the percolation of manures on the soils of Long Island. There are soils, however, which admit the passage of liquid manures through them without any apparent loss. We make this remark lest some of our readers should be led to suppose that we inculcate the doctrine that there is no soil where the application of manure, in its present condition, seems quite inexpedient. The subsoil has an important connection with this matter. We have before given some specific directions in regard to it. As to Long Island, we know that good farms have been made there, and that thousands of acres upon it, yet unimproved, could be made into fertile and paying farms.

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

SPENT TAN AND SAWDUST FOR MULCHING FRUIT-TREES.

MESSRS. EDITORS: It may not be uninteresting to your readers to learn that spent tan spread on the surface of the ground, under a tree which has been recently transplanted, is one of its greatest protectors from drought. In the spring of 1853, we set a quantity of fruit trees in a gentleman's garden and fruit grounds. The soil was very dry and gravelly, and it was the common opinion that they all would die from the drought.

The ground was prepared for setting in our usual way, with the addition of loam to set the roots in. After setting the trees, the ground was covered to the distance of two feet from the tree with common sawdust. There was not one fruit-tree that suffered from the drought; and last season several of them bore and ripened fruit.

We set on the same grounds, also, about fifteen rods of arbor vitæ hedge. We mulched them also with sawdust, and there was not one failure.

Last June I set a quantity of arbor vitæ on a bank, close to a wall. I put about two shovels full of spent tan around each tree; and although they were set just as the extremely dry season commenced, not one of them died, although we did not water them.

Villages are frequently built on alluvial soil, and then it is often extremely difficult to make trees flourish. Those who wish to ornament their gardens will find that a liberal supply of sawdust or spent tan added to the soil, either by mixing with it or as a top dressing, is very advantageous.

Either of the above substances, which are usually considered worthless, and

can be had in abundance near all our villages, will many times pay the expense of hauling and applying. Adopt this treatment, and those trees which usually appear sickly in mid-summer will be of a darker hue, and their broad leaves will shelter you from the scorching heat of a summer's sun.

I have no doubt that near almost every country village sufficient quantities of sawdust and tan are wasted every year to top-dress the ground under five thousand trees.

Let me advise you, then, to apply it to your alluvial soils, and your villages will no longer have the appearance of being built in a desert, but rather in the luxurious soil and in the balmy climate of the Indies.

Plant trees and make them flourish, and then the weary traveller will admire your scenery, and will thank you for the rare pleasure which such scenes impart; while your own eyes constantly beholding the work of your own hands, you will daily and hourly find occasion to rejoice in the pleasing change.

L. H. Spear.

Brainton, Vt., Feb. 5th, 1855.

ROOT-CROPS.—THE NEW-ENGLAND FARMER AND "WE," vs. THE CORRESPONDENT OF THE NEW-ENGLAND FARMER.

We are very happy to notice the commendation of the learned Editor of the New-England Farmer, with which he prefaces our article, taken from our journal, entitled, "The Value of Root-Crops." We are gratified at this for two reasons, one personal, and the other subjective. That is, we are glad to have his endorsement as to the importance of Root-Crops, and of having more light on the subject of fattening and muscle-producing food.

We are also glad to read the language quoted below, from a correspondent of the N. E. F., who seems disposed to find fault with something, or else to be troubled with what scholars call *cacoethes scribendi*—are thus glad, because we think if there was unfavorable criticism to be made on that short essay, this writer might have discovered it. But he represents us as taking a position we never have taken, and then attacks it. Whether he *carries* even that fiction, remains to be seen. Our language was as follows: "*We are inclined* to explain it (a certain fact) on the principle that concentrated nutriment is not so wholesome as that which is more diluted. The more diluted our food, provided we do not overtask the energies of the intestinal canal, in the conveyance of it to its destination, the better for the health of the animal. *May not this be the rule?* In such cases the absorbents have more time, and a better opportunity to possess themselves of what they need, without suffering anything to escape them. We do not assert this. We only *suggest*, where no one appears to establish anything."

But out of this doubly-guarded enquiry and "suggestion," this correspondent, E. C. P., objects to us because—"among other objectional sentences, (sentiments?) I can not help noting the following: 'The more diluted our food, provided we do not overtask the energies of the intestinal canal, in the conveyance of it to its destination, the better for the health of the animal.'

"Now this means, (says our critic,) if it means anything, that the less concentrated the food of animals,—that is, the greater proportion of bulk to nutriment,—the 'better for the health of the animal.' The writer does not

seem to perceive that, in carrying out his doctrine, he must inevitably run it "into the ground;" for it comes to this, that when food is discovered which contains no nutriment at all, it is better adapted than any other for sustaining animal life."

Really, this is singular logic. It reminds us of the so-well-known Paddy, who, on the assumption that the use of a stove would save half the fuel, proposed by buying two, to save it all. We can not seriously find fault with such logic, even if we had asserted what the learned E. C. P. says we have, but leave him in his glory; nor shall we enquire how he *can* "dilute" nutriment when there is none. It is not on account of such criticism that we notice this writer, but, because we would give our own readers to understand, that our opinions, as there expressed, are sustained by one of the best editors in the United States, and, also, to renew our exhortation to them to cultivate root-crops much more extensively, and to feed them to their stock quite freely. Every week, almost, we find accumulative evidence on this subject. We would not have the diet exclusively nor mainly such; nor can we go with this same E. C. P., of "Somerville," who commends "about sixty per cent. of nutriment to forty per cent. of bulk!" that is, that the nutriment (solid contents, of course,) should be fifty per cent. more than the bulk; for we are quite sure that far less than one hundred and fifty per cent. of nutriment would be quite ruinous to the health of animals. Rather than this, because cheaper, and the results the same, we would "buy two stoves," and save all—the cost of nutriment.

[We publish the following communication without any hesitation, although we are surprised at the statements made by the writer, in respect to exhibitors and committees. We have more to say on this subject, which we perhaps may put into form in season for the present number. But we wonder that any community should tolerate, for a moment, any approach to such practices as are described in the statements below. We must believe that such occurrences are very unfrequent.—Eds. P. L. & A.]

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

FAIRS AND HUMBUGS.

Although we are *said* to be fond of being *humbugged*, yet I apprehend that we may possibly overdo the thing, and become disgusted with it. In fact, there are some men who already have become so, and declare that all fairs are humbugs. The utility of fairs, in future, must depend on the manner of conducting them, and the character of the articles and stock exhibited in them, and the candor and honesty of the exhibitors and judges.

Few men who have been attendants on our fairs, have failed to notice the attempts at deception practised by exhibitors; in fact, it has become so common, that honorable men are hardly expected to be perfectly reliable in these matters.

The true friends of improvement have it in their power to prevent, in a great measure, these evils, if they will set themselves about it in earnest.

It may require some time and effort to remove these evils, but the advantages to be obtained are worth the effort. We cannot afford to lose the impulse that has been given to agriculture, and the improvement in stock

and agricultural implements by fairs, because these are not conducted as they should be, or because a few unprincipled men care for nothing but to advance their own interest by imposing upon the credulous.

When a man presents a sheep on exhibition, that a committee are confident was shorn *high stubble*, as it is called, which means, so shorn as to leave the wool one inch long at shearing; or paints them, so as to make them appear like black-tops, when they are not so, let a committee report what they believe to be the fact in a few such cases, and the effect will be felt as far as the case becomes known.

True, this would require some independence in judges, but that is what we ought to expect. If men have not that quality, they are not the men we want for those places, and they had better not serve in them.

Shall a committee say to the public that an article or an animal is worthy of commendation, when they are confident it is not so? Certainly not. By so doing, they inflict a great injury on the cause they are chosen to advance.

Let every honest man sustain truthful reports, and set his face like flint against impositions, and those that are guilty of such deception would abandon the fairs or their evil practices.

Although there is perhaps no other stock so liable to deceive as sheep, yet, by over-feeding and other ways they are made to deceive the buyer, the spectator, and perhaps the public.

In hopes that these few thoughts, imperfectly expressed, may do something to increase the utility of fairs, I leave them at your disposal.

W.

Ohio, Feb., 1855.

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

WASTEFUL FARMING.

Mr. Editor:—Each farm has within itself the means of its own improvement. Science of late years has done much to improve the most ancient of arts; still there is much left to accomplish. The field of investigation is still but partially explored. But there is, of late, a spirit of inquiry in most of our farming communities, as to the best system to be pursued for the improvement of the soil, which speaks for good.

There are but few pursuits that would suffer the loss and waste to which the farmer submits in manure, and other modes of wasteful management, without a failure. Our manure heap is our capital and bank of deposit. Here refuse of all kinds should be safely placed to be converted by the laboratory of Nature to some useful purpose. The farmer would be astonished were he to know fully how little the system of reproduction is understood.

There is an immense loss in not yarding stock in a proper manner, and supplying muck or turf to absorb the urine. Where barns have stood for years without a cellar under them, and, for several generations, the manure heaps have been deposited, all that is wanting is, that this soil be carted to the field. Here is one of the many means of improvement.

Again we can see a great advantage in the the change of soil, by carting from the most barren knoll soil of a different character. The most wonderful effects, sometimes, are thus produced. This process supplies to the soil that which was wanting for the formation of a perfect plant. Here, again, ac-

cording to my theory, we have within our reach the means of greatly adding to the amount of our crops.

The larger the crop, if judiciously managed, the larger the manure heap, and, on our system of reproduction, the better prepared for the next. By pursuing this system, our lands will increase in fertility from year to year.

Another great loss the farmer is subject to is from the wrong application of manure to his fields. Different soils require different applications; while the heavy, tenacious soil will require the manure on the top of the furrow, and the dryer soil that it be turned under. There can be no particular rules laid down on paper for the application of manure. The practical tiller of the soil must use his best judgment according to the nature of the soil, and the crop he intends to raise. On this subject our farmers need much light, which they should obtain by reading and experiment.

There is another large loss the farmer is subject to from the planting of a particular crop on the wrong soil. A particular crop planted in a particular location would prove a dead loss; while, by planting it elsewhere, it might drove a source of profit. Good cultivation will, generally, do much to insure a good crop. One acre, well cultivated, will be of as much actual profit as three, poorly done. It costs no more to cultivate one acre for a full crop than it does for a half a crop—the acre proving a profit, and three a loss; while, by a good cultivation, the value of the one acre is increased, and, by the poor cultivation, the value of the three is diminished.

We would not be understood to discountenance the purchasing of highly concentrated fertilizers. On the application of these, at present, our farmers need much light. But we would be understood that we do not make use of one-half the means within our reach for the improvement of our farms and crops, and have, therefore, no reason to find fault, or be disappointed, if such farming is not found profitable. D. L. HARVEY.

DOCK RAILWAY, LIVERPOOL.—At the last meeting of the British Association, there was exhibited a large model of a high level railway, which it is proposed to carry along the east side of the whole line of docks at Liverpool. The construction will consist of iron frame-work supporting two platforms. The lower will be about 52 feet wide and 20 feet above the present quays, designed entirely for goods traffic, having four lines of railway—the two nearest the docks to be used as sidings for trucks while loading and unloading, and the other two as up and down lines for trucks in motion. The upper platform is to be about 28 feet wide, and to have two lines of railway, intended for passengers only. The lower platform will be provided with hydraulic cranes, which will transfer goods either from or to the vessels or the trucks, as well as work through the hatchways in the platform to the quays. The scheme embraces the construction of deposit and transit-sheds, a connection with existing or future railways, and with private warehouses, and the erection of passenger-stations. The great thoroughfares will be crossed by bridges, and the line will be equally applicable for horses or locomotive power. The cost is estimated at less than £250,000 a mile. This includes hydraulic cranes and platforms, with stationary steam power to work them. On the other hand, it is calculated that the value of the quay space gained by the platforms of the railway, at the low rate of £5 a yard, will yield a return of about £210,000 a mile, not much below the estimated expenditure.

HORTICULTURAL.

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

THE CULTURE OF THE ROSE.

THE Rose, on account of its exquisite sweetness and surpassing beauty, is often termed "The Queen of Flowers." Although there are some flowers which may have a more gaudy appearance; yet there is none which possesses so many excellent qualities as the Rose, and none so universally admired, or so generally cultivated. It is the universal favorite. No flower, either, is of more easy cultivation, particularly in the Middle, Western, and Southern States.

We can scarcely pass a house, however humble, without seeing one or more of the family Rose, within the garden or about the door. These, during the months of May and June, give a cheerful and an enlivening appearance to every thing around, and are calculated to drive dull melancholy from the most phlegmatic.

But why should the pleasure thus afforded be confined to the short season of a month or two, when it might, with little trouble or expense, be extended through eight or nine months in the year? In this respect, the Rose surpasses every other flower which can be grown in the open air. There are many varieties of this beautiful flower, which, under proper cultivation, will bloom profusely from early spring until late autumn. And who that has a taste for the sweet and the beautiful, would willingly forego this luxury of nature? This would argue, not only a want of refinement, but a want of taste for Nature's works.

Many persons, no doubt, are deterred from the cultivation of fine roses, from an apprehension that they are too tender for the climate, and require more attention than they are willing to bestow upon them. But this is entirely a mistake. The rose is much more hardy than many persons suppose. It will stand the winters of the Middle and Western States, uninjured, almost without protection. But as our winters are sometimes pretty severe, it is best to guard against this contingency by throwing around the root of the rose a little protection; and this will require not more than one minute's labor to the plant. I have found that to draw up the earth a few inches—say from four to six—around the root of the rose, is quite sufficient. Indeed, this is a better security than wrapping it up, and keeping it warm by putting manure around it. This keeps it too warm, and causes it to throw up tender shoots beneath the protection, which never fail to be killed when exposed to the air. There is more danger of killing roses by keeping them too warm than too cold during winter. They should be kept sufficiently cool to prevent them from vegetating until the frost is entirely over, and there is no danger. It is true, the tops may be killed, but this is no serious disadvantage. A rose must always put out a new growth before it blooms, even if the last year's wood should not be killed; and when the plant is killed down by the frost, or cut with a knife, it will throw up more vigorous shoots, and grow better, and bloom prettier, than if the old wood should remain untouched, either by the frost or the knife. It is a great mistake to suppose that, because the rose has been bitten down by the frost, that it is killed, or even injured. Protect the root, and what is called the neck, or collar of the plant, and there is no danger. I have had, growing in my garden, in the open ground, for several

years, all the varieties of the ever-blooming rose, such as the Tea, Bengal, Noisette, and Bourbon, and have never lost one by the cold weather, when protected as I have described.

A good deal has been said on the different methods of propagating the rose—whether it should be on its own roots, or on a foreign stock. Each method, no doubt, has its advantages and disadvantages. Some will do best when budded on a good thrifty stock; others, perhaps, will succeed better on their own roots. There is a very general prejudice existing against budding roses. There are two objections urged against it. One is, that the bud is often inserted so high up on the stock that it cannot be protected, and consequently is killed by the frost. There is great weight in this objection, and I would advise my friends never to purchase a rose that has been budded some distance above the ground, particularly if it belongs to any of the tender families. A rose should always be budded as near to the surface of the ground as possible; and then, when transplanted, the point of inoculation should be placed a little below the surface, and this point being protected during the winter, there is not the least danger of its being killed. Sometimes, when planted in this way, roots will strike out from the bud, and then it will have a double advantage.

Another objection to budded roses is, that the stocks are apt to throw up suckers, which not only prove troublesome, but often draw the nourishment from the rose. This, it is admitted, is sometimes the case; but it is very easy to distinguish between the two, and the suckers should always be removed as soon as they make their appearance.

I have had considerable experience on this subject, and can say, that in many respects I prefer a rose budded on a hardy, strong-growing stock. It is hardier, more thrifty, and blooms better. I have frequently lost roses in the winter when on their own roots, although protected; but never when budded. The reason is obvious: for when the top of a rose is tender, the rest is so too, in the same proportion; and when a tender rose is on its own roots, and the top should be killed, the root is very apt to be killed also. But I find the prejudice against budded roses is so deeply rooted in the minds of some people that no reasoning will remove it; and the old adage is verified,

"Convince a man against his will,
He's of the same opinion still."

Well, I suppose we must use another old adage, and say,

"What can't be cured
Must be endured."

I have sometimes been amused at persons when they would come into my garden; they would exclaim, "O, what pretty roses!" and earnestly inquire, "Why is it that your roses bloom so much better than mine?" "O," I would answer, "it is because mine are *budded*." I would then give my reasons for believing a budded rose was better than one on its own roots; and although they seemed to be convinced of the truth of what I said, yet, when asked which they would prefer, "O," they would say, "they never intended to have a budded rose!" Thus you see it is of no use to reason with some persons.

The rose requires a strong, rich soil to bring it to perfection. If it is not *naturally* rich, it must be made so. I have found that *alluvial* soil, with a portion of sand, is well adapted to the growth of the rose; so also is well rotted chip manure, leaf mould, or rich virgin soil from the woods. It is of service to take up a rose every three or four years, and transplant it, trimming the roots, and renewing the soil about it. This seems to give it new life and

vigor. The surface around should be kept loose, and clear of weeds. I have also found that *mulching* is of great service, particularly in summer. It prevents the too rapid evaporation of the moisture, and keeps the ground in good condition around it.

Roses should be kept well pruned. All the dead and sickly-looking branches should be removed, and a proper shape given to the plant. This not only improves it in appearance, but makes it more thrifty, and increases its blooming qualities.

Nothing has a more beautiful appearance than a garden with roses of different hues richly arranged in it. It seems to impart a cheerfulness to everything around it. A garden is a pretty good index of the character of the inmates of a dwelling; and I have often thought that I could determine, with a good deal of accuracy, respecting the industry, good taste, and refinement of a family, by taking a peep at the garden as I passed by their house. It requires but little time or trouble to plant a few trees in a yard, or a few flowers in a garden, and the pleasure thus afforded will more than balance the trouble and expense of doing it. Besides, this greatly increases the intrinsic value of a place, and if a man wished to sell, he might expect to get more for a place thus improved and ornamented, than he could get if there were no such improvements.

A taste for these things should be encouraged in children—particularly in females. The cultivation of flowers is particularly adapted to young ladies. Indeed, I have thought that a female without a taste for the beauties of Nature, was destitute of at least one distinguishing trait of female character.

To cultivate flowers is not only a pleasing employment, but it conduces greatly to health. We know that a beautiful garden will attract the attention of females, and bring them out to the open air when they could not be induced to leave their room were there no such attraction.

J. R. B.

Rosemont, near Nashville, Tenn.

THE GROUPING OF ROSES.

[We find in the *Courier*, published at Louisville, Ky., the following advice in reference to the grouping of this splendid variety of plants in the embellishment of grounds. We are not familiar with all these varieties, but we know many of them to be as described, and we give the entire article a place in our journal, as the opinion of a professed florist, who appears to understand what he writes about.—Eds. P. L. & A.]

In our paper of Saturday, we endeavored to point out the rewards that may be gained by a proper grouping of roses, and we promised to give some aid towards this enjoyment by giving a list of such roses as may be relied upon for this object. Those who carefully study the whole subject may give an infinite variety of effects by a judicious grouping. But we proceed to the names and characters of roses for the purpose we have indicated:

We begin with the *Remontants or hybrid perpetual Roses.* These should be the favorite of the garden. They grow luxuriantly, bloom freely through the season, have a variety of colors and a delightful fragrance. Among the preferable ones of this class, we rank the following:

Baronne Prevost—Bright red, and very large.

Cornet—Bright rose color, with odor of the Cabbage Rose.

Duchess of Sutherland—Light pink color, and ranked by the rose fanciers of France as among the first.

Geant des Batailles—Brilliant crimson, superb in size and appearance, and deemed nearly perfect by rose fanciers.

Jacques Lafitte—Deep brilliant rose color, and a splendid flower.

La Reine—Brilliant glossy rose, large and superb. This is a prime favorite with rose cultivators.

Madame Laffoy—Dark crimson, very brilliant, large and splendid.

Marquise Bocella—Pale blush, dwarf.

Mrs. Elliott—Bright lilac, crimson.

Prince Albert—Rich velvetty crimson, one of the most beautiful of the whole family of perpetuals. We have never seen any Remontant rose that we preferred to this. We are glad to see that it is becoming a denizen of Cave Hill Cemetery. It will be a beautiful gem in that city of the dead.

Rivers' Perpetual—Is another great favorite of those who know the merits of the Remontant roses. Its colors are very rich, and it is quite a prolific bloomer.

Sidonie—A brilliant rose color, very perfect.

William Jesse—Light crimson, lilac tinge, large and very beautiful.

The name *Remontant*, meaning to grow again, indicates the character of this variety. A succession of blooming periods may be looked for from the Remontants. The perfection of the foliage, variety in the colors of the petals, in the shape and size of the flowers, and the delightful fragrance of the Remontants have made them welcome guests in every flower garden.

Bourbon Roses.—The Bourbon Roses are well called ever-blooming plants. They richly reward the cultivator. We name a few choice specimens:

Leveson Gower—This is esteemed equal to any of the Rose family. It is very large and double, and of a deep rose color. It is equal in form to the Souvenir de Malmaison, and that is merit enough.

Hermosa—This is an old variety, but none of the new favorites have been able to displace it. The flower is cupped, very double and perfect, and the plant is one of the most prolific of bloomers; color, a very delicate rose.

Queen of the Bourbons—The most indifferent person could not pass this plant in bloom without pausing to do homage to its beauty. The flower is a delicate fawn color, cupped beautifully, very fragrant, large, and its rich glossy appearance makes it resemble wax-work. No group of roses can be complete without it.

Souvenir de Malmaison—We are sure that no one who has properly cultivated this rose ever hesitated in putting it at the very head of all roses. It is perfect. The foliage is unsurpassed in richness, the flowers cupped, perfect in form, very double, with thick velvety petals. The flower is the largest of all the roses, but its petals are compact and shingled with perfect regularity. The flowers are often from four to five inches in diameter, and their color is an exceedingly delicate blush, tinged with cream. It is one of the most prolific of bloomers, one of the earliest in the spring, and one of the last of the autumnal bloomers. This is a deserved favorite in Cave Hill Cemetery, and it flourishes there in all its perfection.

Raymond—A deep pink, tinged with purple.

Emile Courtier—Four cupped, double and perfect, and color a deep rose.

Enfant d' Ajaccio—A rapid grower, making shoots from twelve to fifteen feet in length. Flower double-cupped, very fragrant, and a brilliant scarlet crimson.

The Bourbon roses properly grouped with the Remontant family, and well cultivated, would be the pride and glory of any grounds, and we hope to see Louisville extensively ornamented in this way. But the means of grouping are not yet complete.

The China or Tea Roses are essential to a tasteful grouping of the plants. These, like the Remontants and Bourbons, have perfections of their own. We name such as will aid in making charming groups. They are peculiarly adapted to bedding out upon a lawn, but also make rich pillar roses. An Englishman, living in Rome, made a number of rose arcades, called Pergoles, which he ornamented with the China rose. Andot, who was entranced with the splendor of the beauty, says: "It is impossible to conceive a more splendid bloom than that of these roses trained upon pergoles so graceful. The foliage was hidden under the gorgeous drapery of the glittering roses."

The China roses should be kept free from weeds, and young shoots should be kept pegged down, in order to make masses of foliage and bloom of every variety of tint. Parsons, in his great work on the Rose, speaks commendingly of the adaptation of the China rose to the terraces of grounds. The slopes should be planted with dwarf China roses, the shoots of which should be pegged down. A magnificent mass of brilliant and various bloom will reward the labor. But to the varieties.

Adam—Flowert cupped, double, very large, and perfect in form; color, rich glossy rose.

Agrippena de Cramoise—One of the oldest, but the principal favorite of this class. It is beautifully formed, and its rich crimson color is unsurpassed. It is hardy, and a prolific bloomer.

Devoniensis—A beautiful flower of immense size; color, a fine creamy white. The flower bud is the most beautiful of all with which we have any acquaintance. The odor is very rich.

La Sylphida—A pale yellow, and very beautiful.

Barbat—Fawn colored flower, and superb.

Niphetoes—Large pure white, very splendid.

La Pactole—Form of flower, cupped; color, pale sulphur; centre, deep lemon yellow. An abundant bloomer, and quite hardy.

Saffrano—The half opened bud is one of the gems of floral beauty. It is a rich fawn color. Of all the fawn colored roses this is the most beautiful.

Souvenir d'un Ami is ranked by rose fanciers as the queen of tea-scented roses. It blooms freely, and its large imbricated flowers resemble those of the Malmaison; color, a delicate crimson, shaded delicately with rose tints.

Triumphe de Luxembourg—An old but still a favorite variety. The plant is of luxuriant growth, the flowers of immense size, rose and buff color, and very fragrant.

Noisette, or Climbing Roses.—*Ami Vibert*—A small fragrant, perfectly double, pure white flower.

Belle—White, with rosy centre.

Fellenberg—Very prolific, bright crimson flowers.

Jaune Desprez—Bright fawn color, and one of the most fragrant of all the tea or Bengal roses.

Ophire—Bright salmon and fawn colored flowers; one of the most beautiful of its class.

Monstreuse—A fine blush, and a capital rose for pillars.

He that may study and cultivate these varieties will obtain rewards and gratifications from which he will not be willing to part. And it must be remembered that a perfect feast of rose pleasures cannot be enjoyed without having members of the four classes we have described to-day.

THE TRANSFER OF BEES.

Mr. Eddy gives the following information, with directions, in the Puritan Recorder, in reference to this subject. We think he understands the business as well as any man:

"The reasons for a transfer are:—1. The leaky condition of the hive; 2. The bad condition of the comb. 3. The presence of the Bee-Moth. When a transfer becomes necessary, and is decided upon, the method of performing the operation is as follows:—1. Close the Bee entrance with cotton batting; 2. Nail a thin piece of board over the same; 3. Slide a zinc plate, or its equivalent, between the bottom board and the base of the hive; 4. Invert the hive with the bottom board held in place; 5. Remove the bottom board; 6. Set the new hive upon the zinc plate; 7. Adjust the hives so that no Bees can escape when the zinc plate is removed; 8. Withdraw the zinc plate; 9. Rap smartly upon every side of the hive, for twenty or thirty minutes, until the Bees are thoroughly routed, and nearly all of them have ascended into the new hive; 10. Slide the zinc plate between the two hives; 11. Set the new hive precisely in the place of the old one; 12. Remove the zinc plate upon which the new hive stands.

The operation is now complete, with the exception of a very few Bees which remain in the old hive. These are now to be drummed out, at a short distance in front of the new hive, and they will return to the familiar spot. I choose to perform the operation in the after-part of the day. Care should be taken that the Bees which are to be transferred, should occupy a stand by themselves. This is a matter to be attended to early in Spring. One prime object of the transfer is to get rid of the black comb which is no longer suitable for use. Of course I do not transfer this comb to the new hive. I lose, and expect to lose, the young which are found in the brood comb, at the time the transfer is made. For this loss, I receive more than an equivalent in the new circumstances of prosperity in which the colony is placed. The transfer should usually be made in the month of June. I prefer about the middle of the month. If it is done later than this, sufficient winter stores may not be secured. For further particulars, relative to Bee management, I would refer your readers to my book on "Bee Culture;" a copy of which will be sent to individuals, free from postage, who may forward to my address nine letter stamps."

New Mordant in Dyeing.—A Swede named Rydin, has published a method of obtaining a fine blue, of excellent tint, for cotton, by employing as a mordant the oxyd of chromium, dissolved in an acid; in place of this oxide, a double salt may be used, such as the double sulphate of chromium and potash. This salt is obtained by mixing one part of a solution of bichromate of potash, and one part and a half, or two parts, of sulphuric acid. Alcohol, sugar, or any other substance capable of converting the chromic acid into an oxyd of chromium, may be added. The oxyd is added to a decoction of logwood, and the dyeing may be effected in one operation, by putting together the salt, the decoction, and the cotton, and heating the whole. Or the cotton can be treated with the salt, hot or cold, and may then be placed in the decoction until the desired color is obtained. By varying the proportions of the salt to the decoction, very delicate shades of gray and lilac may be obtained.

THE HORN AIL.

The notion that this was a specific disease has long been denied by skillful surgeons and doctors. The opinions now prevalent, which are deemed worthy of confidence, are well given by Dr. Dadd, in his remarks at a late legislative agricultural meeting in Boston. He remarked, that Veterinary science had been too long neglected in this country. He commenced practicing the Veterinary art some twelve years ago in this city. There were many who pretended to prescribe for diseases of animals, without knowing anything about them, and would commence some very funny operations.

They would examine the horns, and would sometimes bore into them, and, perhaps, let out a little pus, if they found the horn cold.

He considered, however, that heat or cold on the surface were only *symptoms*. If the surface was hot, the circulation of the system was active; if cold, the reverse was true.

There was communication from the horn to the nares, or nostril, and any pus in the horn would, of course, run down through the nostril instead of upwards into the horns!

Sometimes this might become tenacious, so as to stop the passage. Then it was requisite to steam the nostril to make it run down. By penetrating the living membrane, or by admitting the atmospheric air by boring, inflammation was apt to ensue.

He maintained there was no such disease as "horn ail." Has examined animals said to die of horn ail. Has found a softening of the brain. And this arises often from an improper condition of the stomach. Many diseases of the brain originate in the stomach.

He has some fine anatomical preparations of horns which he invites people to examine. There is a perfect channel to the tip of every horn. There are longitudinal divisions of the horn, and if, in boring, the gimlet hits one of the partitions, it appears to be solid. If it chances to go between two of these partitions, it would appear to be hollow.

The cold horn is really only a circumstance indicative of the state of circulation in the system.

He was called to see a cow that had been driven ninety miles. Some of the neighbors guessed she was constipated, and gave her a pound of salt per day for three days in succession. No effect was produced, and another advised thirty-six drops of Croton oil. A third caused a quarter of a pound of gunpowder to be given. If some matches had been given with the gunpowder it might have been heard from!

He found the cow groaning, and recommended ending her misery at once by killing. This the owner would not do. The cow died in a few hours, and he found all these nostrums in her paunch.

Now if medicine be turned down a cow's throat very slowly, almost imperceptibly, the animal has the power to send it, and will send it, to the real digesting stomach. It must be poured very slowly to get to this second stomach, otherwise it goes into the paunch where it can do no good. The stomach of the horse is quite different.

It requires skill and science to prescribe properly for a dog or a horse as well as for a man.

Many die of flatulent and spasmodic cholic. The intestines appear as if knotted up. Without knowledge this cannot be cured. The seat of the disease is in the nervous system. There are two sets of fibres in the intestine,

the longitudinal and the circular. The contraction of these makes a mechanical obstruction, presenting this knotted appearance, and leaving the passage hardly as large as a goose-quill.

He contends that animals perspire as we do—that a great deal of matter passes off by the "insensible perspiration." Hence we should rub them to promote circulation on the surface and prevent congestion.

Kindness to cows is requisite. They do not return all the food from the ruminating stomach; only the coarser parts.

The Alderneys are very nervous. It annoys and injures them, especially, to be ill-treated. Indigestion is the result.

BARBADOES TAR FOR HORSES.

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

MESSRS. EDITORS: When I first tried my luck as a physician, I had in my possession a gallipot of Barbadoes tar, which I had purchased of the executors of a deceased physician. They did not know what the article was, and I kept it a long time before I knew. The first use I made of it, was to apply it to my horse's tail, after pricking; it relieved the soreness to the extent, the tail might be turned over the back, and the horse would not move, which was an indication that the movement of the tail was not painful.

It may not be known to every one, that Barbadoes tar, or rack oil, is the principal ingredient in British oil, and oil spike. The oil from Seneca Lake, N. Y., is an inferior article. In preparing this ingredient for use, I melt the tar with an equal quantity of lard, *mixed well.*

Any person who will make a trial of the above, will derive a benefit. The flesh of the horse is of a dry, inflammatory nature, and it is difficult to promote a discharge of pus; and this article will promote this discharge more effectually than any other article known to me. When this point is attained, the inflammation will cease, and the cure is much facilitated.

A. HUNTON.

Hyde Park, Vt., Feb. 11, 1855.

CHLOROFORM FOR ANIMALS.

DR. JACKSON, of Boston, the first discoverer of the value of ether in surgical operations, commends the use of a mixture of ether and chloroform in operations on domestic animals. This mixture may be conveniently inhaled by the animal, by wetting a sponge with it, and placing it on a basket or muzzle, to be attached to the head, in the same manner as teamsters often feed their horses with provender. The sponge should first be saturated with water, squeezed dry, and then the mixture, one part of chloroform, and four parts of ether, mixed in a bottle, may be poured upon the sponge as required, supplying it anew as it evaporates.

This mixture Dr. J. regards as a safer application than ether alone. He has never known a fatal accident from its use, where it was inhaled in connection with atmospheric air. The latter is necessary in inspiration to sustain the functions of life. Animals which perspire freely will bear strong doses, while it should be given very cautiously to cats, dogs, etc. The Dr. commends its use in shoeing refractory horses.

VALUABLE STATISTICS.

We select the following useful tables from the volume recently prepared by Mr. De Bow, from the census returns. The title of each table explains its special design. We shall probably have occasion to refer to them hereafter.

Land actually cultivated in the several Crops of the U. States, 1849–50.

Products.	Acres.	Products.	Acres.
Indian Corn	31,000,000	Tobacco	400,000
Meadow or pasture lands—that proportion which is regarded improved, and exclusive of Hay crop	20,000,000	Sugar	400,000
		Barley	300,000
		Rice	175,000
Hay	13,000,000	Hemp	110,000
Wheat	11,000,000	Flax	100,000
Oats	7,500,000	Orchards	500,000
Cotton	5,000,000	Gardens	500,000
Rye	1,200,000	Vineyards	250,000
Peas and Beans	1,000,000	Other products	1,000,000
Irish Potatoes	1,000,000	Improved but not in actual cultiva'n.	17,247,614
Sweet Potatoes	750,000		
Buckwheat	600,000	Total improved lands	113,032,614

Imports of several leading articles into the U. States, 1821–1853.

Years.	Cotton manufactures.	Woollens.	Linen manufactures.	Silk manufactures.	Coffee.	Sugar.	Tea.	Specie and bullion.	Iron and steel manufactures.
1821	$7,589,711	$7,437,737	$2,564,159	$4,486,924	$4,489,970	$3,553,895	$1,342,636	$8,064,990	$1,868,529
1825	12,509,516	11,392,264	3,887,787	10,290,743	5,250,828	4,232,662	3,728,935	6,150,765	3,706,416
1830	7,862,326	5,766,396	3,011,280	5,932,242	4,227,021	4,630,922	2,425,018	8,155,964	3,655,848
1835	15,367,585	17,834,424	6,472,021	16,677,547	10,715,466	6,806,425	4,522,806	13,131,447	5,351,616
1840	6,504,484	9,071,184	4,614,466	9,835,757	8,546,222	5,781,428	5,427,010	8,882,813	3,184,900
1845	13,863,282	10,666,176	4,923,109	9,928,411	6,243,532	4,780,720	5,761,788	4,070,242	5,077,788
1850	20,108,719	17,151,509	8,134,674	19,596,858	11,234,835	7,558,654	4,719,232	4,628,972	7,078,603
1851	22,164,442	19,507,309	8,795,742	28,026,268	12,851,070	13,845,940	4,798,005	5,453,592	8,182,438
1852	19,689,496	17,573,694	8,515,709	23,609,279	14,474,900	14,718,359	7,285,817	5,505,044	8,048,618
1853	27,731,313	27,621,911	10,236,037	33,048,542	15,564,590	14,993,003	8,224,853	4,201,382	7,838,791

Exports of certain leading articles from the U. States, 1821–1853.

Years.	Cotton.	Tobacco.	Specie.	Rice.	Flour.	Fish.	Manufactures.	Lumber.	Beef and pork, cattle & hogs.
1821	$20157,484	$5,648,962	$10478,059	$1,494,307	$4,298,043	$973,591	$2,584,916	$1,822,077	$2,052,439
1825	36,846,649	6,115,623	8,797,055	1,925,245	4,212,127	1,078,773	5,417,978	1,988,220	2,763,144
1830	29,674,883	5,586,365	2,178,773	1,986,824	6,085,953	756,677	5,320,980	2,056,289	2,032,928
1835	64,961,302	8,250,577	6,477,775	2,210,331	4,394,777	1,068,534	7,294,073	3,402,924	2,415,493
1840	63,870,307	9,883,957	8,417,014	1,942,076	10,143,615	720,164	9,873,462	2,926,846	2,518,267
1845	51,739,643	7,469,819	8,606,495	2,160,456	5,398,593	1,012,007	10,329,701	3,099,455	4,918,093
1850	71,984,616	9,951,023	7,522,994	2,631,557	7,098,570	456,794	9,992,444	4,493,658	9,155,895
1851	112,315,317	9,219,251	29,472,752	2,170,927	10,524,331	481,66	21,296,498	4,640,206	6,057,973
1852	87,965,732	10,031,283	42,674,135	2,470,029	11,869,143	453,010	19,987,430	4,991,184	5,265,899
1853	109456,404	11,319,319	27,486,875	1,657,658	14,783,394	461,016	22,721,660	4,996,014	8,416,878

Commerce of the U. States with several Foreign Nations, 1790–1853.

Years.	Great Britain and dependencies.		France and dependencies.		West Indies generally.		Netherlands and dependencies.		Hanse Towns.	
	Imports.	Exports.	Imports.	Exports.	Imps.	Exp'ts.	Imports.	Exports	Imports.	Exports.
1790		9,246.562		4,668,902				47,240		478,050
1795	30,972,215	9.218,540	20,288,013	12,653,635	85,186	1,543.348	3,699,615	2.884,817	1.663.439	9,655,524
1800	42,577,590	27.310,289	9,644,323	5,163 833	26,937	115,631	7,132,627	5,669,016	4,998,975	8,012,846
1805		25,047,386		21,072.747		3496.947		17,835,216		3.232.508
1810		16,555,488		137,630		369,931		174,078		1,126,382
1821	29,277,938	26,522,272	5,900.581	6,474.718	3,727	560,513	2.934,272	7,688.336	990,165	2 591,275
1830	26,804,984	31,647,881	8.240.885	11,806.238	7,386	247,121	1 356,765	4,562.437	1.873.278	2 274,880
1840	39,130,921	70,420,846	17,908,127	22,349,154			2,326 896	4,546,085	2,521,493	4,198,159
1850	85,117,477	88,388,675	27,636,265	20,183,094	9,417	67,934	2,732,569	3 571.607	8,787,874	5,206,522
1853	113,219,260	145,553,624	33,525,999	27,044,479		98,125	2 594,619	2,979,332	13,843,455	8,020,053

Years.	Russia.		China.		Spain and dependencies.		Mexico.		Colombia, C. America, Brazil, Argentine, Conf. and Chili.	
	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports	Imports.	Exports.
1790						1,989.421				
1795	1,168,715	66,221	1,144,103	1,023,242	3,942,445	4,714,864				
1800	1,524,995		4,613,463	1,047,385	16,071,918	15,660.606				
1805		71,372		322,075		12,672,768				
1810		3,975.698		319.479		14,941,942				
1821	1,852,199	628.894	3,111,951	4,290,560	9,653,728	7,218 265				
1830	1.621,899	416,575	3,878.141	742,193	8.373,681	6 049,051	5,235,241	4.837,458	5,528 856	4,756,347
1840	2,572,427	1,169,481	6,640,829	1,009,966	14,019,647	7,617,347	4,175,001	2,515,341	9.093,688	5,891,478
1850	1,511.572	864,941	6,593,462	1,605,217	15,864,748	9,931.240	2,135.366	2,012,827	16,553,496	8,125,825
1853	1,278,501	2,456,653	10,573,710	3,736,992	26,030,320	11,847,101	2,167,985	3,558,824	23,280,079	8,577,131

HOOF-BOUND.

Dr. Dadd gives the following directions for this disease: "In all cases, we must endeavor to give the frog a bearing on the ground; and, in order to do this, the shoe ought to be removed. A dry, brittle, and contracted hoof may be improved by repeated poulticing with soft-soap and rye-meal, applied cold. So soon as the hoof softens, let it be dressed, night and morning, with turpentine, linseed oil, and powdered charcoal, equal parts. Yet, after all, a run of grass in a soft pasture, the animal having nothing more than *tips* on his feet, is the best treatment. A very popular notion exists, that cow manure has a wonderful effect on a contracted hoof; but it is the candid opinion of the author, and no doubt the reader will coincide, that filth and dirt of every kind are unfavorable to healthy action. Such a remedy, aside from its objection on the score of decency, savors too much of by-gone days, when live eels were sent on an errand down horses' throats to unravel their intestines. If any benefit belongs to such an objectionable application, it is due to the property it possesses of retaining moisture; therefore, cold poultices and water are far superior. Clay and moist earth, placed in the stall for the horse to stand on, are far inferior to stuffing of wet oakum, which can be removed at pleasure. In order to keep it in contact with the sole, we have only to insinuate two strips of wood between the sole and shoe; one running lengthwise and the other crosswise of the foot. It affords considerable pressure to the foot, is cooling and cleanly, and is far superior to the above articles."

BIOGRAPHY OF EMINENT MEN

ERASTUS BRIGHAM BIGELOW.

The subject of this notice was born April 2d, 1814, in West Boylston, a small town of Massachusetts, seven miles north of Worcester. His father had a little farm, to the toils of which he added, with Yankee versatility, the business of a wheelwright and that of a chair-maker. The boy was sent, of course, to the district school. At the age of eight he asked his master to put him into arithmetic and writing, but he was pronounced too young for these high branches. He was not, however, to be headed off so. He took up Pike's Arithmetic at home, performed, unassisted, every question as far as the Rule of Three, and made a fair record of the whole. Who does not see in this a promising outset?

But his school and his arithmetic engrossed only a fraction of his time. His boyish activities showed early a mechanical tendency. With minute fence of regular post and rail he inclosed a few yards of ground. This was *his* little farm. There might be seen a plough, a cart, a wagon complete in every part, with other implements of husbandry, all of his own making, and of a size to match. His live stock was a litter of kittens. To carry out his idea, he must set them to work: a yoke was made, and two of these small steers were attached to the cart. Finding that they insisted on pulling backward, he turned their heads toward the cart. The wheels now went forward, but the team could not be guided; the experiment consequently failed.

Not content with being a farmer and a wheelwright, he went into the chair line. Having made a chair-back, he so finified it with paint and bronze and gold, that folks looked on with wonder, and predicted that the boy was destined to become a great painter.

He contrived to get a violin, and it was not long before he could execute with facility the then popular airs of "Bounding Billows," and "Away with Melancholy." This was a new phase. His career, evidently, was to be a musical one. Kind neighbors even suggested that he might hope ere long to find high and profitable employment in the orchestra of the Boston Museum, consisting at that time, if we remember rightly, of a fiddle and a hand-organ.

John Temple, a neighbor of Mr. Bigelow, was a substantial farmer. He had noticed the lad's capacity, and sometimes jokingly asked him to come and live with him, and learn *his* occupation. Erastus regarded this proposition as a business matter. With him, an offer was an offer. Accordingly, one Monday morning in early spring, this boy of ten years presented himself at Mr. Temple's door and demanded employment. It was given him, with no expectation that he would continue through the day. He worked on, however, and at the end of the week suggested to Mr. T. that it would be proper to come to some understanding in regard to wages. On being asked his terms, he offered to work six months on condition of receiving at the close, a cosset lamb called "Dolly," to which he had taken a strong liking. The moderate demand was of course acceeded to. But scarcely had a month elapsed ere a difficulty arose. Dolly could not live without eating, and how was he to provide for her? His fellow laborers discovered the cause of his anxiety, and teasingly aggravated it. At length he proposed and effected

an alteration in the contract. He relinquished his claim to Dolly, and Mr. T. agreed to furnish, instead, a pair of cow-hide boots, and sheep's-gray cloth sufficient for a suit of clothes. The agreement was fully carried out on both sides. At the close of the period, an offer of four dollars a month for the ensuing summer was made and accepted. The kind-hearted man, at parting, gave the young farmer a silver dollar.

During the next two years he continued to work for Mr. Temple in the summer, and to attend school in winter. The farmer urged him to stay till he should be of age, and he offered to do so if, at the close of the term, he could receive in compensation a small outlying farm belonging to his employer. Fortunately, this offer was declined. It was an escape not unlike that of Daniel Webster from the clerkship of the county court.

In 1827, Mr. Bigelow removed to another part of the town, and engaged in the manufacture of cotton yarn. Erastus was set to work in the mill. So long as he found anything to study in the machinery and its working, he was interested; the occupation then became distasteful. While employed in this drudgery of tending spindles, he was busy in framing plans for the future. His grand desire was to obtain a liberal education. As his parents, from their limited circumstances, could not encourage him in this, he began to consider in what way he might accomplish the object himself. He already knew how to earn and to save. He had not only clothed himself by his toil, but to his first silver dollar had added several more. Like Goldsmith, he now turned his musical talents to account. In a community where critical connoisseurship was unknown, he passed for an accomplished performer. At all balls and dancing parties for many miles around his services were in request. After a long day of spinning, how tedious must have been a whole night of fiddling! Often, doubtless, his eyelids grew heavy and his arm a-weary. Who can think of the motive which nerved that arm, without respect for the young violinist?

About this time he made his first invention. It was a hand-loom for weaving suspender webbing. It accomplished the object; but as the business would not justify the employment of an operative, he abandoned it, after realizing from it a few dollars. His next invention was of more importance. A ball of cotton cord, known in the market by the name of "piping cord," had been brought into the house for domestic use. On examination, he found it to be of yarn like that which he was spinning every day. On inquiry, he learned that it was made by hand, in the ordinary rope-walk. He was sure that it could be formed more expeditiously and cheaply by automatic machinery. In a few weeks he had matured the plan of a machine, and within two months he had it in successful operation. It worked well—earning for the youthful inventor In the course of a year about one hundred dollars. At length the article fell greatly in price, and the working of the machinery was abandoned.

These first developments of a peculiar genius were evidently called forth by his burning desire for an education. They were temporary expedients to enable him to pay his way. It should not be forgotten that they were the achievements of a lad only fourteen years of age. Having now by his industry and ingenuity acquired a small fund, he obtained parental consent to attend a neighboring academy, at his own expense. This was in 1830. Here he entered on the study of Latin. His teacher was pleased, and wrote to the father, recommending a collegiate course for the boy. But to the cautious parent, a trade seemed safer and better. As the son preferred not to engage again in the dull employment of the spinning mill, the matter was

compromised, and he was told that he might go to Boston and become a commission merchant, if he could.

To Boston accordingly he went. He carried no letters—knew no one. After a few inquiries from door to door, he found employment in the wholesale and retail dry-goods establishment of S. F. Morse & Co. The firm was highly respectable, and the place was deemed a good one. But the charm of novelty was soon over, and then the occupation of measuring and selling ribbons and calicoes seemed petty and monotonous. He felt, he knew, that he was made of something beyond *that*. The idea of a college course still haunted him. On one occasion he walked out to Cambridge, and had a talk with President Quincy. It only served to show that there was no chance yet for him.

About this time a teacher of stenography came to Boston and gave lessons in the art. He drew much attention and formed large classes. Our young clerk shared in the general interest, but the cost of a course (ten dollars,) was beyond his means. So he got some books and taught himself. He was surprised to find the art so simple. In a few days he could write with ease in short-hand. A new thought struck him. If *he* could learn stenography in this way so quickly and easily, why should not others—why should not many avail themselves of the useful, labor-saving process? The rareness of the acquirement must be owing to the expense. He would obviate that. He would write a book on short-hand, illustrated by plates, and filled with rules and examples. Energetic and industrious—to resolve, with him, was to act. In a short time his work—"The self-taught Stenographer"—was ready for the press. To prosecute this new enterprise, he relinquished his post behind the counter, much to the regret of his parents, who naturally questioned the expediency of the step, and to that of his employers, too, whom he had fully satisfied.

Having printed a small edition of his work he became his own bookseller, and in ten days sold seventy-five dollars' worth in Boston alone. This greatly encouraged him. Forgetting that Boston was peculiar and prepared ground, he regarded his sales there as an exponent of the national demand, and immediately ordered a large impression of the work. To meet the extensive business now opening upon him he took a partner, a medical student, who was anxious to see a little of the world before he settled down as a professional drudge. The young doctor was to pay the entire cost of printing, to share equally in the labor and expense of distribution and sale, and to receive one-half of the profits. These hopeful adventurers set out at once upon their commercial travels. They visited the most inviting portions of New-England, New-York, New-Jersey, and Pennsylvania. Here the cholera, then on its first terrible march through America, put a stop to their journeyings. They went home, having made about a hundred dollars. Four hundred dollars were still due the printer, a large part of the edition was yet on hand, and all the best ground had been canvassed. It looked decidedly dark. Young Bigelow without hesitation released his discouraged partner from the pecuniary obligation.

Behold him now at the age of eighteen. His little educational fund has vanished, all his schemes have failed, and he is four hundred dollars in debt. His father, in the meantime, had been extending and diversifying his business. He had formed a partnership with the celebrated "John Smith," and a new mill had been erected for their operations. As the old mill now stood idle, Erastus thought that he might turn it to some account. In this project he found a person willing to join him. John Munroe was the name of his

second associate. Their business was the manufacture of twine. It was beginning to be moderately successful, when a disagreement between Smith and his partner put a stop to the operations of the younger firm.

Bigelow & Munroe then undertook to run a cotton factory in Wareham, a place in the eastern part of Massachusetts. At the end of nine months this arrangement terminated in a loss. As author and as manufacturer, he was now obligated to the extent of fourteen hundred dollars. In Massachusetts his way seemed completely hedged up. But Massachusetts is not the only place in the world. Soon after this we find our hero in the city of New-York, taking lessons in penmanship of the renowned Professor Bristow. His improvement astonishes even himself. A dozen exercises have transformed a poor writer into an accomplished penman. Then, for some time, he supported himself by teaching the art. Newark, and several other large towns in New-Jersey and on the North River, enjoyed the benefit of his instructions. He was not the person to be content with such a life. Indeed, he soon became deeply dissatisfied with that and with himself. An important period of his existence was passing away in desultory and unprofitable efforts. He was conscious of powers that needed discipline only to insure him success. His literary aspirations returned in full force. But, alas! what could he do?

In this state of mind he returned home. His parents received him kindly, but could not suppress their anxiety concerning his future. In that humble family council many plans were started and rejected. At length, with unanimous approval, the youth resolves to become a physician. After a winter passed in classical studies at Leicester Academy, he entered his name as a student in medicine. This study he prosecuted with diligence for more than a year, being much interested in the science, but constantly annoyed by a sense of his imperfect literary preparation. Even then, could he but find the means, he would go back, to start anew and aright. Again the stimulus of this early and strong desire put him on the look-out for some source of pecuniary gain. With his mind in this state, he happened, while on a visit, to sleep under a knotted or Marseilles quilt. Years before he had seen similar fabrics woven by the slow and costly process of the hand-loom. Why—he now asked himself—could not a power-loom be made to weave them? It was not until a year afterwards that he set himself in earnest to solve this problem. Having suspended, for a time, his medical studies, he matured the plan of a loom. With some pecuniary aid he was enabled to construct the machine, which worked to the satisfaction of all.

But to prosecute the enterprise, capital must be had. In quest of this he went to Boston. A sample of the fabric was shown to Messrs. Freeman, Cobb & Co., who were large importers of the article. Satisfied that it must succeed, they entered at once into an agreement, contracting to pay all expenses thus far incurred, to be at the cost of patents for this country and for England, and to erect and furnish a mill that should meet all probable demands of the market. In consideration of this contribution, the inventor was to receive, free of expense to himself, one-quarter of the profits. A brighter day had, at length dawned on the struggling youth. He had reached the position so long sought. He could now secure a thorough education. Accordingly he renewed his studies under the care of a clergyman, who was in the habit of fitting young men for college. Must we state that even this fair prospect was soon clouded? Freeman, Cobb & Co. failed in business. The period was one of commercial depression, and was, therefore, no time to raise capital for new enterprises. To increase his embarrassments,

his father had been unsuccessful in his affairs, and was now in declining health. His own position and his sense of filial duty, left him no alternative. The sternly-exacting present must be provided for. Postponing to an indefinite future his half-realized schemes and hopes, he once more relinquished his classical studies.

While, to meet the exigency, he was earnestly considering the question of "ways and means," an incident of travel recurred to his memory. In his stenographic journeying he had accidentally witnessed the process of weaving coach-lace. At the time, he had felt no interest in the matter—had taken no note of the details. He only remembered that hand-looms were employed. With this recollection, the idea of a power-loom immediately presented itself. Two days' study convinced him that the thing could be done. But another point must also be settled: would it pay? He was wholly unacquainted with the character and extent of the coach-lace business. Hiring of a neighboring farmer his work-horse and old yellow-bodied chaise, he starts, with characteristic promptness, on a tour of inquiry. The carriage makers of Worcester, Grafton, Framingham, Medway, and Dedham, were successively visited and interrogated. The result was a general reference to Messrs. Fairbanks, Loring & Co., of Boston, venders of the article, with whom these mechanics all dealt. Into Boston accordingly went the yellow chaise. Messrs. Fairbanks & Co. settled every doubt. A coach-lace power-loom, they said, would certainly do well; but the thing had been often considered by the principal lace-makers, and pronounced an impossibility. They expressed a wish to join with him in case of his succeeding—though, as they afterwards confessed, without the slightest faith in the project.

Mr. Bigelow went home, and with no other guide or help than a piece of coach-lace set himself to the accomplishment of a task, which, up to that time had been deemed impossible. Spurred on by necessity, and encouraged by a confident hope of success, his mind became intensely active. To others, indeed, he seemed to have grown suddenly stupid. When spoken to, he appeared to listen, and yet showed by his silence or inapposite reply, that he had not understood a word. One evening he was asked to show a visitor the way out. To the surprise of the latter, he took an unlighted candle, marched silently before him through a long, dark entry, and gravely bowed him from the door. During this period of mental abstraction, he took no note of time. He sat in the family circle with as little share in the conversation as if he had been deaf and dumb. All hints about bed-time were thrown away upon him, and the unmoved candle-stick, whose taper had expired in its socket, usually showed in the morning that he must have gone off to his rest, at some late hour, in the dark.

The fruits of this extraordinary application soon appeared. Within six weeks from the time of its first conception, he had a power-loom in successful operation. Let any one examine this beautiful and complicate piece of mechanism, in which iron seems to act like an intelligence, and exhibits a dexterity which human fingers scarcely surpass. Let him consider that this machine involved all the essential principles of a far more important one—the Brussels carpet loom; that the inventor was a young man not twenty-three years old, who had never even looked into a treatise on mechanics; and finally, that all this was accomplished in the brief space of forty days; and he will, at least, allow that the history of useful art exhibits few such instances of mental and executive efficiency.

Thus far we have traced, with some particularity, the ardent aspirings, the varied efforts, the successive struggles and disappointments of a poor but

persevering youth. It shows what may be accomplished by high aims, a fixed purpose, and resolute industry. It will appeal to the warm sympathies of those who love to contemplate the development of mind and character under a discipline of hardship. We have followed a rivulet from its mountain spring. Obstacle after obstacle has opposed its progress. But above, or round, or through them all, it has still forced its way. In one bright flash it has just leaped over the last wall of rock. It becomes a deep, broad river: its banks widen out and wave with fertility. But we must not be disappointed, if we miss, henceforth, the picturesqueness of its upper course.

The complete success of the coach-lace loom brought the inventor at once into notice. Fairbanks, Loring & Co., of Boston, John Wright, of Worcester, Israel Langley, of Shirley, together with the inventor and his brother Horatio, united for the purpose of building and running the looms. This association afterwards became the "Clinton Company." Mr. B. was now in a condition to carry out his early and long-cherished, though often frustrated wish in regard to education. But the time for that scheme had, he felt, gone by. He had become better acquainted with the nature and measure of his own capacities. He saw opening before him a career of activity, success, and usefulness. To this, accordingly, he resolved to devote his future life.

Soon after the Clinton Company began its operations in Lancaster, the affairs of Freeman, Cobb & Co., had become so far adjusted as to liberate from its legal embarrassment the counterpane loom. One of the firm immediately contracted with the inventor on terms highly favorable to the latter, for a number of the looms. But Mr. Bigelow happening soon after to be in New-York, saw there a new and different species of counterpane then just introduced from England. An examination of this fabric convinced him not only that it would be more marketable than the knotted counterpane, but that it could be made at less cost. With a disinterestedness hardly less rare than his ingenuity, he advised Mr. Roberts to give up the contract, and thus lay aside entirely the very curious and perfectly successful loom already made. He at the same time agreed to invent a power loom for weaving this new fabric. Within six months from that time he had such a loom in successful operation. A small mill in Lancaster was filled with the machinery, and the business, steadily prosperous, has remunerated the inventor, and enriched others.

After starting the coach-lace and counterpane establishments, Mr. Bigelow took up the question of weaving the ingrain or Kidderminster carpet by means of power-looms. It was no easy matter to produce a fabric in which the figures should match, which should have a smooth, even face and perfect selvedge, and do this with a rapidity so much beyond that of the hand-loom as to make it an object. The hand-loom weaver can, to some extent, meet these conditions by the exercise of his judgment. If the shuttle has not fully done its work, he can give the weft-thread a pull with his fingers. If, on measuring, he finds that the figure is getting to be too long, or too short, he remedies the fault by putting either more or less force to the lathe, as he beats up. If he perceives that the surface of the cloth is becoming rough, he regulates the tension of the warps. By the exercise of constant vigilance, skill, and judgment, he can *approximate* to the production of a complete and regular fabric. But how shall these properties be imparted to inert matter? How shall iron be taught to observe, to judge, and to vary its action with such modifications as the case may require?

To the achievement of this seeming impracticability our inventor now addressed his extraordinary powers of analysis and concentration. A short study assured him that the idea was feasible. On the strength of this conviction—before he had made a model or even complete drawings of the machine—he entered into a written contract with a company in Lowell, to furnish them with power-looms for making ingrain carpets. His first loom for two-ply carpets was set up within a year. In the matching of its figures, in evenness of surface, and in the regularity of its selvedges, its product far surpassed that of any hand-loom. Its average daily work was from ten to twelve yards; that of the hand-loom is about eight yards.

He *must*, he *could*, do better than that. A second loom, with various modifications and improvements was ere long produced. By this the daily product was raised to eighteen yards. Still he was not satisfied. A third machine, with essential variations, at length appeared. This loom made, with perfect ease, from twenty-five to twenty-seven yards a day. The others, of course, like his first counterpane loom, were thrown aside. This loom was started in the summer of 1841. In the autumn he went to England. During this short visit the manufactures of that country naturally drew his special regard. He at once saw that, in some important particulars, the English manufactures were in advance of ours. His opinion to this effect, frankly expressed on his return to Lowell, was received at first with murmurs of surprise and incredulity. It was not long, however, before the practical adoption of his suggestions showed that they had taken full effect. In 1842 the several manufacturing corporations of Lowell paid a deserved tribute to Mr. Bigelow's knowledge and skill, by creating a new office, with a liberal salary, and appointing him to fill it. His duties were to make improvements and suggestions, and, generally, to advise and consult with the agents of the respective companies. In this capacity he brought forward some important improvements, which were adopted by all the cotton mills of Lowell. Finding his new office too general in its character and duties to give results satisfactory to himself, he resigned at the end of eighteen months, and with his retirement the office itself expired. During this period he built, for the Lowell Company, a mill to receive his power-looms; and thus started the first successful power-loom carpet factory recorded in the annals of manufacture.

Before quitting his post at Lowell, Mr. Bigelow had projected a new manufacturing establishment at Lancaster for the weaving of ginghams. A company was formed; the required capital was promptly subscribed, and the projector was charged with the execution of the design. At the same time the Lowell Company resolved to build a large mill for the reception of their carpet power-looms, and Mr. Bigelow was commissioned to design and erect it. Both of these mills are of vast size, and in character perfectly unique. The one last named, with its two hundred iron looms, is, in fact, a grand carpet machine—the mill and its furniture being so combined, adjusted, and adapted, as to produce the most harmonious action and the highest results. The Lancaster mill is even more remarkable. Its connected structures, covering more than four acres of ground, are filled with machinery and apparatus of the most perfect character, much of which was invented or adapted, and all of which was arranged and adjusted by Mr. Bigelow. Of this mill, the editor of the *Merchants' Magazine* says: "It is deservedly rated as the most perfect establishment in the United States." Of the dye-house connected with it, he speaks as "probably the most perfect in the world;" adding, "that the entire arrangement is of the most perfect description, and in its

vast completeness stands a splendid monument to the genius and masterly power of the mind of its projector." These immense structures, with their numerous and various and complicated machines, many of which were new, and nearly all of which were newly modified or adjusted, were carried on simultaneously—the working plans for the buildings and the machinery being furnished as fast as the work advanced. These plans, once matured and put into the hands of the workmen, were scarcely in a single instance changed; and the loss in this way was exceedingly small—a striking proof of Mr. Bigelow's business talent, his constructive abilities, and far-reaching mental vision. Contemporaneously with these labors, he superintended important enlargements of the Counterpane Works, and of those belonging to the Coach-lace Company. Nor was this all. During the three years thus occupied, he made nine distinct, important, and patented inventions. It would have been strange if, under a mental pressure so constant and intense, his health had not given way. Justly alarmed, at length, he fled from the toil and care which would soon have ended all. A voyage to Europe, with his family, and a continental journey, completely restored him.

On his return in 1848, he proceeded to develop and complete the Brussels Carpet Loom. The basis of this machine was indeed contained in the loom for coach-lace. But farther invention was needed to adapt it to the weaving of wider fabrics, to the making of figures that match, and to the formation of velvet-pile. This was fully accomplished. His power-looms weave rapidly and perfectly the Brussels and the Wilton, the tapestry and velvet tapestry carpets. They are competent, in fact, to every kind of looped and velvet-pile fabric known in the market.

In September, 1851, Mr. Bigelow took with him to England specimens of his Brussels carpet. Their appearance at the Exhibition, though late, drew much attention, and largely increased the favor with which the British public had already begun to look on the so long despised American Department. The juries having then closed their labors, no prize could be awarded to these fabrics. But in a supplement to the Report on Class XIX, we find the following:

"The specimens of Brussels carpeting exhibited by Mr. Bigelow are woven by a power-loom, invented and patented by him, and are better and more perfectly woven than any hand-loom goods that have come under the notice of the jury. This, however, is a very small part of their merit, or rather of that of Mr. Bigelow, who has completely triumphed over the numerous obstacles that presented themselves, and succeeded in substituting steam-power for manual labor in the manufacture of five-frame Brussels carpets. Several patents have been taken out by different inventors in this country for effecting the same object; but as yet none of them has been brought into successful or extensive operation, and the honor of this achievement—one of great practical difficulty, as well as of great commercial value, must be awarded to a native of the United States."

The shrewd and practical manufacturers of England were quick to see and prompt to acknowledge the value of the new machinery. An arrangement was immediately made with Messrs. Crossly & Sons, for placing the looms in their immense carpet manufactory at Halifax. Subsequently these gentlemen purchased, and now hold, the patent-right for the United Kingdom.

Previously to the introduction of Mr. Bigelow's inventions, power-looms had scarcely been used for any but the plainest and simplest fabrics. These improvements cover the whole higher range of textile art. If we except such regal luxuries as the pictured tapestries of the Gobelins, there is no

complex, or useful, or beautiful texture produced by skill and patience in the hand-loom, to which his machinery has not been, or may not be, adapted. As compared with the plainer and more prosaic processes, this almost magical mechanism, and its results of endless and beautiful variety, may be called, not unaptly, the poetry of the loom. With such means at their command, and aided by the untiring arm of falling or of expanding water, our modern Penelopes are producing webs that rival the fabled labors of Arachne, with a rapidity which Pallas might have envied.

To appreciate the difficulties of this achievement, and the greatness of the success, one must keep in view the nature and demands of the weaving art. Each different fibre which it uses has its own peculiar properties, and whether it be cotton, or wool, or flax, or silk, the machinery must be adapted to those peculiarities. The number of fabrics which differ essentially in their texture is almost countless. To these considerations must be added the constantly recurring changes in figure and in color required to meet a fickle taste and ever-varying demand. *He* must be a good arithmetician who can calculate the combinations required to produce by automatic machinery the numerous dissimilar fabrics which fill up the long interval between plain cloth and a Wilton carpet. More than all, perhaps, it deserves to be considered, that a power-loom for weaving tissues of the higher class, must have not only many and complex mechanical movements, but, to a certain extent, also the capacity of self-adaptation—an ability, in fact, to meet exigencies as they arise.

The extent of Mr. Bigelow's contributions to inventive art has often been misapprehended. Many think of him as the inventor of a single machine—the carpet power-loom—and suppose this to be all. It is a great mistake. The numerous and complex requirements of the textile art were not to be met by a single invention. Accordingly, Mr. Bigelow has, in this connection, twenty-two United States patents. Each of these is a distinct but necessary part in a closely-connected series of improvements, by means of which, under appropriate modifications, every variety of fabric may be wrought by power-looms.

It is difficult, by mere description, to impart a clear idea of mechanical movements. All that we shall here attempt will, we trust, be intelligible to any one who has ever seen a loom in action. The figure on coach lace is formed by raising on the surface of the ground-cloth, a pile similar to that of the Brussels carpet. It is made by looping the warps over fine wires, which are inserted under such of them as have been selected by the Jacquard to form the figure. These warps are then woven into the body of the cloth. The wires are now withdrawn, to be reinserted. In the Bigelow loom this finger-work is executed by automatic pincers. There is something wonderfully cunning in the movement of these nippers. Seizing the end of the wire, they draw it out from the loops, carry it back towards the lathe, thrust it into what is called the open shed, and there drop it. The warp-threads, which had been drawn apart, are now closed, and immediately reopened for the passage of the shuttle, which carries the woof to tie and bind the loops. The pincers having dropped their wire, return to take another. As it is necessary to have a number of these wires, and as they lie close together, a difficulty arose. It was clearly impossible to make the pincers so narrow, and so exact in their discrimination, as to seize the proper wire, and not molest its neighbors. This was avoided by a mechanical contrivance on the other side of the loom, which, just at the right moment, gives a little push to just the right wire, and thus puts it in just the right place for the waiting

pincers. The curious mechanism by which these little rods are withdrawn and replaced, must work, it is evident, in perfect harmony with that which forms the figure.

The loom for Brussels and tapestry carpeting is the coach-lace loom full grown. Nothing short of actual inspection can give any just idea of its wonderful capacities and life-like action. Wires three feet or more in length are here inserted and withdrawn with a precision and quickness which no manual dexterity ever attained. Let us watch the operation. First, mark that intruding knife or wedge, which, as it rises, separates from its companion the wire next to be taken, and guides the pusher, which shoves it along towards the pincers. The pincers now walk up, grasp the wire, and draw it entirely out. While this is doing, another set of nippers, hanging down like two human hands, come forward, descend, and catch the wire at the moment when the drawing pincers drop their prey. No sooner have they seized the wire than they retreat to their original position, beneath which a small, angular trough has just arrived. The fingers relax, and the wire drops into the trough, which immediately returns. Last of all, a triangular pusher rushing through the trough sends the rod into the open shed. Note, also, the double action of the withdrawing pincers, which, while they attend to their own special mission, perform, also, sergeant's duty, by constantly bringing into line the straggling wires. Those bird-like, three-fingered claws, which dart back and forth with such rapidity, are busy in plaiting the selvedge, and their work is perfect. These, too, are "contrived a double debt to pay," for, whenever their thread breaks, they instantly stop the loom. In this loom, and that for coach-lace, the mechanical contrivance for weighting the warp-threads is the same, being one of the most ingenious, as well as most important, of Mr. Bigelow's improvements.

What is this remarkable process which we call *invention?* How does the brain act while devising its wonders of mechanic skill? These are questions of interest to inquiring minds, and may well puzzle those to whom even the witnessed action of complicate mechanism is a mystery impenetrable. By some it is supposed to be a sort of hybrid process—a result in which chance and calculation are about equally concerned. Accident has, doubtless, at times, had something to do with it. The slightest incident may start the train of thought which shall lead to some great discovery or invention. But in that train of thought there is nothing random or accidental. The mathematical element must, of necessity, figure largely. Yet in the mental series it is not first in order, nor is it, in fact, more essential than another faculty seldom associated with our ideas of machinery. The great mechanical inventor is, perhaps, the only person who compels the Mathematics to wait upon the Imagination. This power, and this alone, can supply him with the *means* of accomplishing his purposes. For the effectual use of these means he depends on the science of number and quantity. That this substantially was the process in those inventions to which our attention has now been turned, appears from the following answer of Mr. Bigelow to an inquiry on that point:

"I am not sure that I can convey to your mind a satisfactory idea of the inventive process in my own case. One thing is certain, it is not chance. Neither does it depend, to any great extent, on suggestive circumstances. These may present the objects, but they are no guide to the invention itself. The falling apple only suggested to Newton a subject of inquiry. All that we know of the law of gravitation had to be reasoned out afterward.

My first step toward an invention has always been to get a clear idea of

the object aimed at. I learn its requirements as a whole, and also as composed of separate parts. If, for example, that object be the weaving of coach-lace, I ascertain the character of the several motions required, and the relations which these must sustain to each other in order to effect a combined result. Secondly, I devise means to produce these motions; and, thirdly, I combine these means, and reduce them to a state of harmonious co-operation.

To carry an invention through its first and second stages is comparatively easy. The first is simply an investigation of facts; the second, as far as I can trace the operations of my own mind, comes through the exercise of the imagination. I am never at a loss for means, in the sense above explained. On the contrary, my chief difficulty is to select from the variety always at command those which are most appropriate. To make this choice of the elementary means, and to combine them in unity and harmony—to conduct, that is, an invention though its last or practical stage, constitutes the chief labor.

In making this choice of the elementary parts, one must reason from what is known to what is not so—keeping in mind, at the same time, the necessary combinations, examining each element, not only in reference to its peculiar function, but to its fitness, also, for becoming a part of the whole. Each portion must be thus examined and re-examined, modified and re-modified, until harmony and unity are fully established. From the severity of this labor many inventors shrink, and this is the main reason why some very ingenious men fail to obtain satisfactory results. In my own case, the labor has not ended with the perfection of my looms; other machines, preparatory and auxiliar, were necessary to give full effect to the inventions.

It is a well-known fact, complex inventions have not, as a general thing, come at once into use. In many cases this has been because they were not immediately brought into harmony with other things. In a state of natural progress, things move on together, and become mutually adjusted. An important invention often disturbs these adjustments, and cannot be made to work efficiently until other inventions and new arrangements have brought all the related processes in accordance with it. This arduous duty I have endeavored to perform for all my looms. Lee's hand stocking-loom was invented several years before it was reduced to practice, and even this was not effected by the inventor. The comparatively simple power-loom for weaving plain cloth was of very slow growth. A long time elapsed before its organization was so far harmonized as to work at all, and, for several years afterward, successive improvements only gave to it a moderate speed. Its capacity, in this respect, has actually been doubled within the last fifteen years. If my own more complex machines, for the production of figured fabrics, have attained at once to a high state of perfection, I attribute it, in part, to the fact that my attention has also been given to those processes which are subordinate, preparatory, and collateral, and that these have been made to accord with the main invention. That this claim of success is not extravagant will appear, I think, when it is considered that the cost of weaving coach-lace was, at one stride, reduced from twenty-two cents to three cents a yard, and that of Brussels carpet from thirty cents to four cents. Of the fabric last named, my power-loom, under the easy tending of a single girl, produces from twenty to twenty-five yards daily, and this of the best quality. That mechanical possibilities do not reach much farther in this direction, will be conceded, probably, by all who are acquainted with the peculiar character of the process.

I find no difficulty in effecting that concentration of thought which is so necessary in pursuits like mine. Indeed, it is not easy for me to withdraw my mind from any subject in which it has once become interested, until its general bearings at least are fully ascertained. I always mature in my mind the general plan of an invention before attempting to execute it, resorting occasionally to sketches on paper for the more intricate parts. A draughtsman prepares the working drawings from sketches furnished by me, which indicate in figures the proportion of the parts. I never make anything with my own hands. I do not like even drawing to a scale."

It has become almost a proverbial remark that great inventors seldom reap the fruit of their ingenious toil. This has happened, not merely from the fact referred to above, that they had failed to perfect their inventions by meeting, as they ought, the new demands which their own improvements had created, but, also, because they have too frequently been inventors *only*. Absorbed in their own pleasing projects, neglecting to avail themselves of what they have actually accomplished, in their ardent zeal to achieve something greater, they leave their rights unsecured, or suffer them to slip out of their hands. They labor, and other men—far inferior men—enter into their labors. To this rule, if it be one, Mr. Bigelow is a striking exception. He is no dreaming genius, who needs a guardian to protect his rights and manage his affairs. He is as much at home in matters of business as among the wheels and levers of his looms. Several of his most important contracts, drawn wholly by himself, have commanded the admiration of acute lawyers. More than once his patents have been invaded; but, in every case, the offenders have yielded, either to his prudent firmness, or to the strong arm of law. In a single instance—and then through the negligence of a legal agent—he failed to obtain protection, in the English patent office, for some important principles. It was a serious injury.

In the ingrain-carpet power-looms of the great mills at Lowell, about thirteen hundred thousand yards are made annually. The same fabric is woven in large quantities by companies at Tariffville and Thompsonville, Ct., whose power-looms are worked under license from the Lowell Company. Messrs. Higgins & Co. are using the Bigelow looms for tapestry and velvet-tapestry carpets, in their establishment in New-York. Another Company, in Troy, N. Y., is weaving the same article under license from Mr. Bigelow. At Humphreysville, Ct., several looms are now employed in the manufacture of silk brocatelle. Mr. B. adapted and constructed the machinery for this beautiful fabric in 1851. Goods for which the hand-loom artisans of Lyons get three francs a yard, are made here at a cost for labor of fifteen cents a yard. The agent, Mr. Humaston, is entitled to much praise for the skill and perseverance with which he has brought these works into successful operation.

In 1849, Clinton was made a township by legislative act. In 1837, when the brothers Bigelow went to this spot, that they might use one of its brooks in operating the coach-lace loom, it was the least cultivated and least valued part of the old and beautiful town of Lancaster. At that time it contained some two hundred inhabitants; it has now about four thousand. There may be seen the great gingham mill, already named, producing annually nearly five millions of yards; the counterpane mill, which turns out yearly one hundred and fifty thousand dollars' worth of goods; the establishment of the Clinton Company, where two million yards of coach-lace, tweeds, &c., are woven; and that of the Bigelow Carpet Company, belonging to the two Bigelows, and to H. P. Fairbanks, of Boston, the daily results of which are

a thousand yards of Brussels and Wilton carpeting. The amount made by this single establishment, now only three years old, is equal to the entire importation of Brussels carpet from England, at the time when the works were started. Though these looms run night and day, they are inadequate to the constant demand.

We have seen, with admiration, on both sides of the ocean, many a village and city which owed their prosperity, if not their existence, to the genius of modern manufacture. But, to us, there is a charm in Clinton, which belongs to no other place of the kind. As, from those gentle, woody heights, we have surveyed its monuments of ingenuity, wealth, and enterprise—its numerous evidences of industry and thrift—its pleasant homes of competence and content—its institutions for learning and social improvement, and its neat temples reared for God—all of it the magical creation of a few short years—the spectacle certainly lost none of its interest, because we could trace it directly to the efforts of a single mind. Clinton, with all its actual and its prospective importance, was assuredly predestinated in that abode of honorable poverty, those hours of toil and vigil, and that filial love, which gave birth to the coach-lace loom. Happy he who may thus behold around him the good which he has done! While scattering "plenty o'er a smiling land," he plants, also, in good ground, the blessed seeds of individual and domestic happiness, of social progress, of education, and morals, and religion.

It would be a great injustice to omit in this reference to Clinton, one, who deserves to be called its twin founder—Horatio N. Bigelow. At the very outset, while success was yet uncertain, when he was himself poor and struggling, he gave pecuniary aid to his brother in the patenting and building of his inventions. All the mills in Clinton were started by him, and two of them are still under his management. To his skill, industry, and business talent, much of their success is undoubtedly due. It is not easy to estimate the advantage derived by the inventor from so able and so faithful an execution of his plans.

Mr. Bigelow's father, for whose sustenance and comfort he gave up his own cherished schemes, and devoted himself to invention, after aiding his son in building the coach-lace loom, died, much to the son's regret, just before its success was made certain. His mother, not yet very far advanced, lives to share the prosperity and affection of her sons.* He has been twice married. His first wife died early, leaving an infant child. This boy, of much promise, survived his mother hardly seven years. His present wife is a daughter of the late Col. David Means, of Amherst, N. H. They have one child—a daughter.

Mr. B. is a man of middling stature, and slightly inclined to roundness. The lineaments of his face and head are such as one might look for after hearing his story.

The individual, whose well-directed labors have not only gained for himself reputation and fortune, but furnish employment and support to many thousand persons, while they save annually for his native land millions of dollars, is still under forty years of age. With such power of intellectual analysis and combination, such energy and persistency of purpose, he cannot yet have discharged the debt which he owes to his country and to mankind. That he still intends to devote himself to the advancement of industrial art, in all its interests, moral and material, we have the best reason to believe.

* This estimable lady died a few weeks since, at the house of her son, in Boston.

WELCH ANHYDROUS COMPOSITION FOR ROOFS, FLAGGINGS, FRONTS, &c.

WHATEVER may be the firmness of the foundation, the massiveness or symmetry of the walls, and the elegance and tastefulness of external or internal finish, a building without a permanent water-proof and fire-proof roof, is an imperfect and defective structure. It is destitute of one of the most essential qualities of a comfortable, safe, or durable edifice. Hence, a good roofing material has long been regarded as a very important and valuable matter. Ingenuity has been taxed to invent some substantial, reliable, and economical means of protecting persons and property from the annoyance, injury, and perils, which are every where experienced from imperfect roofs.

In Europe, tiles are used; but they are expensive and unreliable. In our own conntry, shingles, slate, tin, zinc, copper, lead, brass, iron, and paper covered with tar and gravel, all have their advocates, and yet none of them exactly meet the exigencies of the case for which they are demanded. Shingles are unsafe, and too often insecure. Slate is expensive, and inaccessible to the great mass of our people. Tin requires great expense of painting, and is constantly exposed to corrosion, and, besides this, it is difficult to repair, and often, being too long neglected, till the roof leaks like a sieve, is beyond the cure of solder and patching, and is, therefore, useless.

This article is rarely used for roofs in Great Britain, or on the continent of Europe. Tarred and gravelled paper, which have been so extensively used in various parts of the country, after a thorough experiment, have gone into almost universal disrepute. All these adaptations for roofs have objections more or less serious, either on account of the cost, security, combustibility, perishableness, or failure in other respects, to answer their intended design.

The Anhydrous Composition, at the head of this article, seems to meet all the exigencies of the case so much better than any other material, that if half that is claimed for it is proved, it must eventually supersede all other materials now employed for such purposes. Those who are conversant with this composition claim for it as an effective and invaluable resistant of water; and, hence, a roof made of it can never leak. Being incombustible, it can not take fire. Such is its nature, that it can never wear out or decay. It is a non-conductor of heat and cold, and, hence, tends to secure a cool temperature to upper rooms in the heat of summer, and a moderate temperature in winter. As the materials that compose it are found in great abundance in every state of the Union, it is universally accessible. It is cheaper than any other permanent roof. It may be put on at all seasons of the year, and is equally adapted to all climates, and to every temperature, both of cold and hot; both wet and dry. It may be manufactured by fixtures of very trifling expense, in every city and principal district of the land. These excellent qualities of this article may be regarded as facts established both by experiment and the ordeal of scientific analysis. If broken by violence, or other cause, it is easily repaired. On all other points, this composition solicits the careful and thorough scrutiny of the public.

It may be applied to roofs perfectly flat, or in situations where the water may remain on them for any length of time, as the water will never penetrate the composition. Sods of grass may be placed on it, and seeds planted and cultivated in the soil, and yet the dampness will not penetrate the roof. It is readily applied, also, to leaky roofs in any situation, whether covered with tin, shingles, sand, or other materials, without removing the old material;

nor do roofs thus treated require any outlay for paint, or other substances, with which to keep it in good order. Gutters as well as roofs are treated with this composition. It is also useful for damp walls, to secure dryness, and in the construction of vaults under sidewalks, in cemeteries and cellars, and to repair them when injured by the dripping of water. If used under sidewalks, and in other similar conditions, it prevents the percolation of water and its pernicious consequences.

It is also well fitted for *deafening* floors, and thus preventing injury to plastering by leakage of water through them.

This Anhydrous Composition, with a little variation of material, and different preparation, may be made into a plaster, and applied to the outside of the walls of brick and wooden buildings, in imitation of granite, brown stone, or any description of marble, white or clouded.

This is claiming a great deal for any material, applied for such purposes, and it may, hereafter, be found that we are in error in respect to it. But we present the claims of those interested in it, (*with some abatement,*) and so far as evidence is furnished to us personally, that these claims are well founded from the evidence furnished us. From the evidence furnished us, we are induced to regard this a very valuable material. We ought, also, to add that it is not costly, but is comparatively cheap, so far as first cost is concerned.

THE WATER-POWER ON THE POTOMAC.

We have recently received a pamphlet containing a minute description of the Water-Power of "The Great Falls Manufacturing Company" on the Potomac, opposite Washington and Georgetown. The legislature of Virginia has incorporated the town of Potomac, at the Great Falls. The surface of the territory thus incorporated is undulating, and abounds with springs of the purest water, and the adjacent country is very beautiful. This town of Potomac is, from Georgetown, fourteen miles; from Washington City, fifteen, and from Alexandria about twenty miles. It includes quarries of building stones, clay for bricks, and an abundance of timbers. Lime and cement are easily procured.

The Water-Power is immense; the fall being nearly eighty feet. A wing dam is also contemplated, raising it five feet more. The Manufacturing Company was incorporated in May, 1852, for a period of thirty years, and with a capital of one million of dollars. The privileges granted them, besides those named, are of very great value. Among these is a charter from the state of Maryland, authorizing a toll bridge across the Potomac, uniting the town with the Ohio and Chesapeake Canal, and from Virginia, for a railroad to intersect with the Orange and Alexandria railroad.

The area of the water way, at Little Falls, is 2,040 square feet; the superficial velocity, 68 feet per minute; the true mean velocity is 56 feet; and, hence, the quantity running is 114,240 cubic feet per minute. The property has been surveyed; the head-gates, guard-walls and dam, have been located by skillful engineers, John and Stewart Chase, of Mass., and Asa Jackson, of Leesburg, Va. Extensive maps are attached to the description, and the whole is ready for any enterprising manufacturers, or capitalists, who will unite in the improvement of this tremendous water-power. Mr. Hall Neilson, of Washington, D. C., is President of the Company.

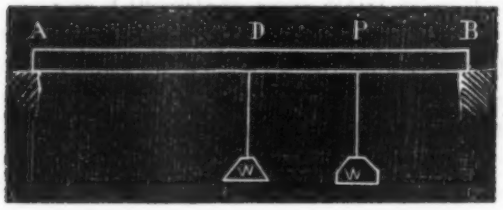
THE STRENGTH OF BEAMS.

In the paper under this heading, in the January number of this Journal, it was found that the formula for the strength of beams was

$$W = \frac{b\,d^2}{l}\,C$$

in which W = the breaking weight of the beam; — b = its breadth; d = its depth; l = its length, and C = a constant quantity deduced from experiment. This formula is applicable when the load is placed in the middle of the beam. If the strength of the beam is just sufficient to sustain it when in the middle, it will be more than enough when at any other point. For if W (Fig. 4) be the greatest weight that a beam of uniform section will support in the middle, D, then the greatest W′, which it will support at any other point, P, will be found by the proportion.

Fig. 4.



$$A\,P \times P\,B : A\,D \times D\,B :: W : W'$$

$$W' = W\,\frac{(A\,D \times D\,B)}{(A\,P \times P\,B)}$$

Therefore, a beam of uniform section throughout, to be used for sustaining a movable weight, as a bridge does a carriage, is unnecessarily strong at all other points, when it is of just sufficient strength at the centre. Indeed, this is evident at first sight; for it is obvious that the leverage exerted by the weight, W, acting at the distances D A and D B from the abutments, is greater than that exerted by the same weight acting at the distances A P and P B.

Theoretically, then, the area of the section of the beam should continually diminish from the centre toward each end, in the ratio of the rectangles of the segments; that is, the section at the point P should be less than the section at the point D, in the proportion that A P × P B is less than A D × D B; so that at the abutments the beam would have tapered to a point.

But here we come to the broad distinction existing between the *strain* and the simple *weight* of the load, between the tendency toward the fracture of the beam and the pressure upon the abutments. The load has a two-fold effect, the former of which alone we have been considering. The one is the simple action of the weight itself, while the other is the action of the weight in conjunction with the leverage. Thus, suppose 50 lbs. to be suspended from the end of a beam 10 feet long, the *strain* exerted will be 50 × 10 = 500 lbs., while the *weight* which the abutment is called upon to sustain is only 50 lbs. The *strain*, from a constant load, varies, of course, as its distance from the abutment, while the *weight* remains constant for any distance. And the cross section of the beam must be of sufficient area to support this weight; therefore, it cannot taper to a point, as the equation would seem to indicate. However, as the weight is generally so small in proportion to the strain, it is scientifically proper that a beam, intended for the support of

movable loads, should be smaller at the end than in the middle; and this is generally or often the case with bridge chords, &c.

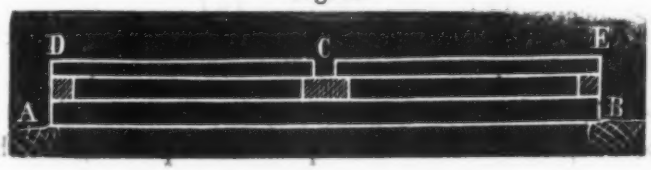
We have hitherto supposed that the weight of the beam itself was nothing; but, practically, we will hardly find this supposition a correct one. The weight of the beam is to be taken into consideration, and many times is a most important element in the calculation. Thus, the greatest load that can ever in practice be placed upon the Britannia Tubular Bridge, over Menai straits, would be a train of locomotive engines, extending from end to end, and would weigh about 1,500 tons. But the weight of the bridge itself is nearly 11,000 tons.

The effect of this weight is, of course, similar to that of a load equally distributed throughout the entire length of the beam, and is to be estimated as such. The weight of each half of the beam may be supposed to be collected at its centre of gravity, *i. e.*, half way between the abutment and the centre of the beam, or at a distance of $\frac{1}{4}\ l$ from the abutment. Designating the weight of the half beam by w, the expression for the strain will be $w \times \frac{1}{4}\ l = \frac{l\ w}{4}$. That is, the strain resulting from the weight of the half beam is equal to one-fourth the product of the length of the beam into its weight.

Suppose the weight, w, to be accumulated at the middle of the beam. It would then act with the leverage, $\frac{1}{2}\ l$, instead of $\frac{1}{4} l$, as before, and the expression for the strain will become $\frac{l\ w}{2}$. Therefore, a beam will sustain a twice heavier load when equally distributed than when accumulated at the centre.

This may be illustrated somewhat more practically by means of a diagram, and as it shows the prime importance of taking the leverage into account in questions of this kind, it may be well so to explain it.

Fig. 5.



Let A B (Fig. 5) be a beam, resting upon the supports, A and B, at the ends. Let D C and C E be weights, resting upon chocks at D, C, and E. It is evident that the effect is the same as though they were equally distributed over the whole length of the beam. One-half of the weight D C, is sustained at D, and the other half at C, and the like is true of the weight C E. But the parts sustained at D and E, immediately over the abutments, act without leverage, and consequently exert no fracturing strain. The parts sustained at C act with a leverage, A C, or its equal, C B, and, therefore, they alone tend toward fracture. But the weight sustained at C is only half the entire weight. The other half rests upon D and E; therefore the beam will support a weight, if equally distributed, equal to twice that which it can sustain if accumulated at the middle.

The weight of a single beam, as compared with the load which, in structures of various kinds, it is called on to sustain, is generally of trivial moment, and may, in many instances, be safely omitted in the calculation. But in large "built beams," such as bridges and trusses of any description, it is of great importance, and must be carefully prepared for. In cases like this, an estimate must first be made of the dimensions of the frame necessary for the

support of its own weight, and then afterward those dimensions must be modified, so as to sustain, in addition, the load about to be imposed.

To illustrate the mode of doing this, let us take one or two examples.

An example given in the previous article was—What is the breaking weight of a beam of oak, 10 inches broad, 12 inches deep, and 14 feet long? The answer was found to be 14,331 lbs. This, of course, includes the weight of the beam itself. We wish to find how much weight can be placed upon the beam in addition to its own weight. Oak weighs about 36 lbs. per cubic foot. The weight of the beam then will be about 420 lbs. This weight being equally distributed, is equivalent to 210 lbs. placed at the centre. The breaking weight proper then, that is, the weight of the imposed load, will be 14,331 — 210 = 14,121 lbs., or 28,242 lbs. equally distributed.

Take another example.

Seasoned pitch-pine weighs about 30 lbs. per cubic foot. What must be the length of a stick of this material, 12 inches square, that the breaking-weight, suspended from the middle, exclusive of its own weight, may be 10,000 lbs? In the equation, $W = \frac{b\,d^2}{l}\,C$ as applied to this case, all the quantities are known, except W and l; the first of which is the entire weight, and the other, the length of the stick in feet. Since the sectional area of the beam is a square foot, there will be as many cubic feet in its bulk as there are linear feet in its length; and each one of these weighing 30 lbs., the weight of the beam will be represented by 30 l. But this weight, 30 l, is equally distributed; its effect is therefore equivalent to 15 l, suspended from the middle. The entire breaking-weight of the beam, therefore, will be 10,000 + 15 l. By the table given in the previous number, we find C = 1,632. And substituting these values in the equation $W = \frac{b\,d^2}{l}\,C$, we have

$$10{,}000 + 15\,l = \frac{12 \times 144}{12\,l}\,1632 = \frac{1728 \times 1632}{12\,l}$$

$$= \frac{235008}{l}$$

$$15\,l^2 + 10{,}000\,l = 235008$$

$l^2 \times 666{,}66\,l = 15667.2$ a quadratic equation, which, being solved, gives

$$l = 22.7 \text{ ft.}$$

In like manner, the equation may be solved for any other of the dimensions; as for instance, to find W, we have

$$W + 15 \times 22.7 = \frac{235008}{22.7} = 10352.8$$

$$W = 10352.8 - 15 \times 22.7 = 10{,}012.3 \text{ lbs.,}$$ which is within a fraction of the value of W, as first given.

For trussed bridges, trussed frames, and such built beams, a shorter way may be adopted.

Suppose a truss supported at each end, and loaded in the middle; or what is the same thing, for our purpose, supported at one end, and loaded at the other. Let the imposed weight be represented by W, and the weight of the truss itself by w. Let h be the height of the truss, and l its length. It is required to find the ultimate strength of each of the two chords, upper and lower = S.

The effect of the load, W, acting at the distance, l, is represented by W l. The effect of the weight, w, acting at the distance, $\frac{1}{2}\,l$, (its centre of gravity) is represented by $\frac{w\,l}{2}$. The sum of the two is $\mathrm{W}\,l + \frac{w\,l}{2}$.

The effect of the strength or resistance, S, of the upper chord, acting at the distance, $\frac{1}{2}\,h$, from the neutral axis, is represented by $\mathrm{S} \times \frac{1}{2}h$; and that of the lower chord is the same. The sum of the two $(\mathrm{S} \times \frac{1}{2}\,h) + (\mathrm{S} \times \frac{1}{2}\,h) = \mathrm{S}\,h$, which will be equivalent to the straining force of the entire load—that is,

$$\mathrm{S}\,h = \mathrm{W}\,l + \frac{w\,l}{2} : \text{ whence}$$

$$\mathrm{S} = l\,\frac{(2\,\mathrm{W} + w)}{(\ 2\,h\ )} = \text{Strength of chord.}$$

It should be remarked that l, as here employed, represents the length of the truss supported at one end and loaded at the other. If the equation be used with reference to a truss supported at both ends and loaded in the middle, l must be halved, and the equation will become

$$\mathrm{S} = l\,\frac{(2\,\mathrm{W} + w)}{(\ 4\,h\ )}$$

To apply this equation, suppose we wish to ascertain the strength and size of chord necessary for a truss bridge of 180 feet span, and weighing 240,000 lbs., and to bear an imposed load of 4,000 lbs. per lineal foot, (which is more than twice as much as any ordinary bridge is ever required to sustain.) The whole imposed load on the bridge will be 720,000 lbs., of which each truss will support one half, or 360,000 lbs., and each half truss 180,000 lbs. (By each half truss, is meant that part between one of the abutments and the middle of the truss.) In this case, then, W = 180,000 and w = 240,000. Let h = 18 ft. while l = 180 ft. Substituting these quantities in the equation above, we have

$$\mathrm{S} = 180\,\frac{(360{,}000 + 240{,}000)}{(\ 72\ )} = 180 \times 8333\tfrac{1}{3}$$

S = 1,499,999 lbs.—say 1,500,000 lbs.

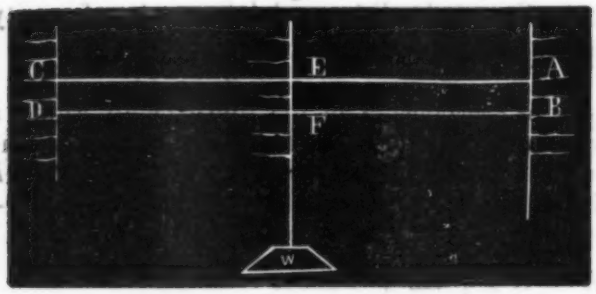
Assuming 8,000 lbs. per square inch of sectional area as the breaking weight of the chords, we have 187.5 square inches as the necessary area of section of each chord at the middle.

The same equation can be solved for any one of the quantities contained in it, when the rest are known.

The legitimate strain created by a movable load, such as a train of cars passing over a bridge, is to be estimated like all other similar strains. It is greatest when the load is at the middle, and diminishes as it approaches either end, in the proportion above stated. The effect of the load at each point in its progress can be easily found from the formulae before given. The *vibration* necessarily attending the passage of such a burden as a heavy train of cars, is to be estimated on other principles, that do not come within the scope of the present purpose. Provision is generally made against such vibration by a system of stiffening and bracing. Therefore, the truss for a bridge is necessarily somewhat more complicated than that for the support of a roof, or any similar stationary permanent load.

Let us find, from the dimensions of the beam, and the breaking weight as data, some formula which may serve as an expression for the strain per square inch of sectional area.

Fig. 6.



If W (Fig. 6) be the breaking weight at the centre, then the load supported by the half beam, B E, will be $\frac{1}{2}$ W. The length of the whole beam, D B, is l, and that of the half beam, B E, is $\frac{1}{2}\,l$. The leverage is equal to this length, divided by the depth, A B $= d$ of the beam, and will be, therefore, $\frac{\frac{1}{2}\,l}{d}$, which is equivalent to $\frac{l}{2\,d}$. The product of this leverage into the weight, $\frac{1}{2}$ W, will represent the entire strain on the cross section, $\frac{l}{2\,d} \times \frac{1}{2}\,\mathrm{W} = \frac{W\,l}{4\,d}$, which, divided by $b\,d$, the expression for the sectional area, will be the strain per square inch; and the formula will be

$$\mathrm{H} = \frac{W\,l}{4\,b\,d^2} : \text{— that is}$$

the strain, per square inch, equals the product of the length of the beam into the entire weight required to break it at the centre, divided by four times the product of the sectional area and depth—all the dimensions being of the same denomination, *i. e.*, all in inches, or all in feet.

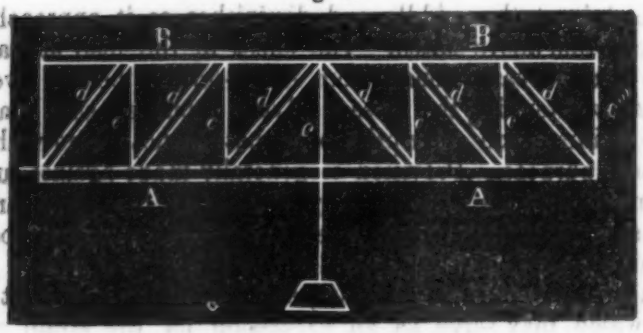
Take the example first given. A beam of oak, 14 feet long, 10 inches thick, and 12 inches deep, just breaks under a weight at the centre—including its own—of 14,331 lbs. What is the strain per square inch of section?

$$\mathrm{H} = \frac{14{,}331 \times (14 \times 12)}{4 \times 10 \times 12^2} = \frac{2407608}{5760} = 418 \text{ — which is}$$

one-fourth of the number given as the value of the constant C for this material. Indeed, we might have reached the same result from the equation itself. For, substituting for W its value, as given in the formula $\mathrm{W} = \frac{b\,d^2}{l}\,\mathrm{C}$, and, reducing, we find $\mathrm{H} = \frac{1}{4}\,\mathrm{C}$.

This is applicable for single, unassisted beams. But it is evident that a disposition of several beams may be made, such that one may assist and support the other. Such is the case in an ordinary truss. It may, perhaps, be well to explain the principles on which the simple but effectual frame is constructed:

Fig. 7.



A A (Fig. 7) and B B are the chords. *c c c''* &c., are the ties, and *d d* and *d''* are the braces. Suppose a load to be suspended from the lower chord, A A. It is communicated by the tie, *c*, to the upper chord, B B, where it is divided and transferred each way down the braces, *d* and *d*, back to the chord, A A; here it is again carried to the

upper chord by the ties, c' and c', whence it is again sent down by the braces, d' and d', and so on, until it reaches the abutments at each end. Thus, the principle of the truss is simply that of distribution. Strain is not allowed to concentrate itself at any one point, but is continually shifted and scattered. Hence it is obvious, that the standard for the strength of truss chords must be very much higher than that for mere unassisted similar beams; and the beam which, single, would support one thousand pounds, may suffer with safety the imposition of a far heavier load, if forming the chord of a judiciously constructed truss. Hence there is no necessary contradiction in the assumption previously made of the strength, per square inch, of a bridge chord at 8000 lbs. The beam itself is, of course, no stronger, or more capable of endurance, but it is so disposed, that the load placed upon it is shifted and thrown off. C. E.

P. S.—In my article in the January number occur two or three misprints, which rather interfere with a correct understanding of the text. On page 412, the words, "that of," in the twenty-ninth line from the top, should be omitted. In the thirtieth line, for "E. W.," read "4 W." In the thirty-first and thirty-second lines, for "x," between "$x f$," and "P," and, also, between "f E," and "W," read "$\times$," the sign of multiplication. In the thirty-fourth line strike out the word "the," before "P;" and in the thirty-fifth line, insert "inversely," between "varies" and "as," and, also, between "is" and "as."

PHOTOGRAPHY.

This art is now attracting much attention from the public, in virtue, not only of the rare beauty of its results, but, of its diverse and infinite applicability to the reproduction of every variety of object. Following appropriately in the wake of the daguerreotype art, it has opened a new field, and awakened a new interest in its growth and perpetuity. The first public dawning of the daguerreotypic art was obscured by the clouds of prejudice and ignorance on the one hand, and distrust and jealousy on the part of artists. It, however, made its way, and, under the guidance of men of taste, skill, and energy, has at length become a recognized and leading feature in the world of art.

It may not be uninteresting to some of our readers to detail the distinction between the daguerreotypic and photographic processes. The daguerreotype, as is well known, is produced by the action of light upon a preparation of chemicals upon the surface of a highly-polished, metallic plate. The reversal of the object daguerreotyped is a necessity of this process. The production of photographs, though similar, differs in the respect that impression is first taken upon a plain surface, and from thence transferred by the action of light, to chemically prepared paper, the transfer again reversing the impression, and thus bringing it back to its original position. The effect upon the glass being durable, the number of impressions may be multiplied to an indefinite extent, at a comparatively nominal expense. This feature is a specially important one, as it affords to clubs, associations, or persons desirons of possessing themselves of portraits of any distinguished individual, ample facilities for doing so. So much for the *modus operandi* of the art. Its advantages, in point of merit, over the daguerreotype, are briefly these: A more delicate softness of tint and transparency of shadow, and an entire free-

dom from the reflected glare of the metallic plates. These, together with certain technical advantages, familiar only to the artist, and the faculty of reduplication, constitute its chief claims to pre-eminence. Its applicability to architectural views, scenery, mechanism, or any object requiring clearness, yet delicacy of outline, is also a prominent feature of excellence.

We look forward, and not far in the future, to the time when the traveller's paraphernalia will be incomplete without a photographic apparatus. Of course the result of this wide practice of the art will be not only to familiarise us with the architectural and scenic features of countries, of which we can now know but little through the medium of verbal or engraved descriptions, but to impel the artist to a more earnest study, and a more correct realization of the importance of truth in art. For, with the perfection of photographic perspectives, the correct and delicate shading of its fairy pencil, challenging their study, and provoking their emulation, artists can not fail to approach nearer to the ultimate standard of excellence—truth.

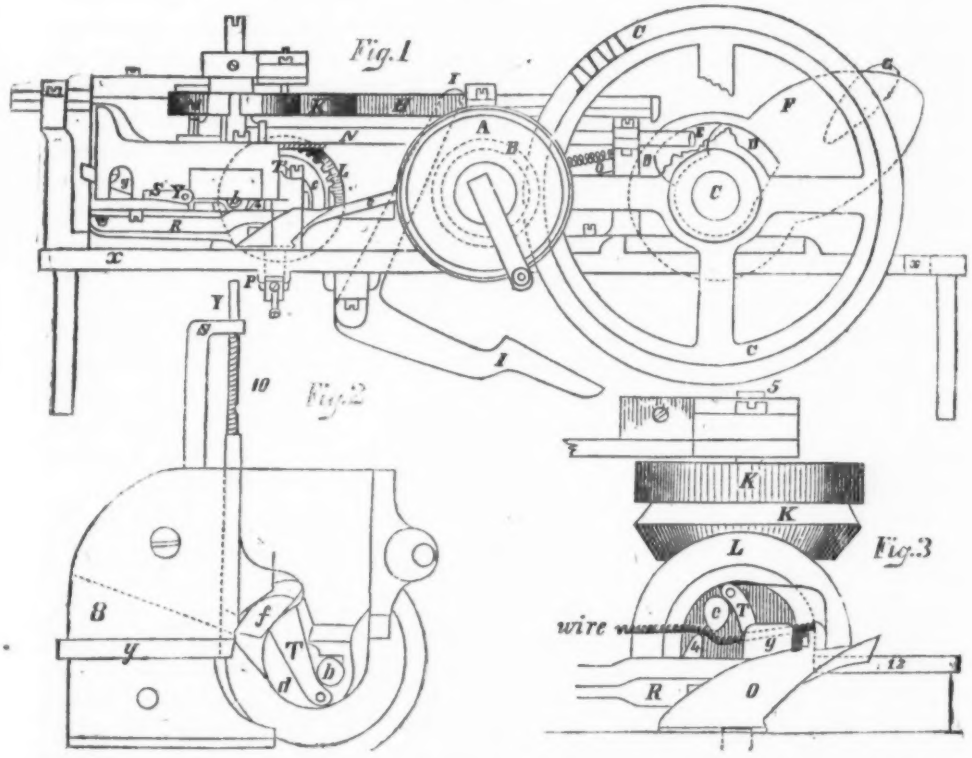
Yet, notwithstanding the great capacity for good which the art possesses, it embodies in no less a degree the elements which may be turned against the interests of art with fatal power. Its assumption by men whose sole object is gain, and its consequent degradation, render it a convenient vehicle for the dissemination and perpetuation of crude and uncultured ideas of art. Unlike the daguerreotype, its susceptibility of being colored, either in oil or water colors, enhances and aggravates the danger. For, if the inferior execution, the degraded pandering to a ridiculous taste for high colors is more generally sought, who can doubt but it will be readily obtained; or who can doubt that the result of such a condition of the photographic art, would entail a serious injury upon the cherished interests of public taste, and a fostering of the love for objects of the beautiful.

The studio of Mr. Brady, of this city, furnishes many fine specimens of the daguerreian art, and this encourage us to hope that his attempts to perfect this new discovery will not be in vain. Indeed, he has already produced some excellent pictures. If he develops its wonderful capabilities, and renders it an aid to the sister arts, and a universal teacher of the true and the beautiful, he will add another to the many laurels he has already won.

White Golden Flint Wheat.—A sample of this superior wheat was exhibited by William Stavely, Esq., at the recent fair in Bucks county, and attracted unusual attention and commendation. The grains were about twice the size of the ordinary white wheat, round and plump; while the color was about the same as the old, and with the millers, a favorite variety. Mr. Stavely informs us that he sowed two bushels on an acre last fall, which produced about twenty-five bushels last harvest. The ground upon which it grew, he does not think the best, and is of opinion that it would have produced about the same amount of Mediterranean wheat. As an evidence of the estimation in which he holds it, we may add that he has put the whole twenty-five bushels in the ground for next year's crop.—*Farm Journal.*

Alderney Cattle.—P. T. Barnum has imported two cows and a bull of the Alderney breed. They came from London in the ship Splendid, and are intended for his farm in Bridgeport, Ct.

MACHINE FOR MAKING CHAIN LINKS.



THE annexed engravings are views of an improved machine for making chain links, and were sent to us by Mr. Arcalous Wyckoff, Columbus, Ohio, to whom a patent was granted on the 14th of last February.

Figure 1 is a side elevation of the machine; figure 2 is a detached view, exhibiting on the under side the cutter and bender of the wire in its horizontal movement; figure 3 is a detached view of a portion of figure 1, to show the action of the vertical bender, sleeve, and lever, giving the middle bend of the link. Similar letters refer to like parts on the three figures.

This improvement in machines for making chains consists in giving the grip and middle bend of the link, cutting the wire the requisite length, and bending both ends of it simultaneously, and, by an automatic movement, delivering the formed link ready for joining in a continuous chain.

In figure 1, *x x* represent a solid table. A is the pulley to which the power is applied, carrying on its shaft a pinion, B, giving motion to the driving wheel, C, on shaft, C; D and E are cams on the horizontal shaft, C, for operating the bars, O and N; F is a large cam also on the shaft, C, which, striking against the end of the bar, carrying rack, H, gives an intermittent motion to the pinion, K, placed on a vertical shaft, which also carries a bevel pinion (placed under K for giving motion to L, carrying a sleeve,) on the outer end of which is a bending arm, which, in its semi-revolution, forms one eye of the link; M is a pinion (driven by K) which is placed on a vertical shaft, and also carrying a sleeve, on the end of which is secured the knife or die, *f*, for cutting the wire into suitable lengths, and, likewise, for bending

the other eye of each link; O is a bar moved by cam E, it operates a lever, R, for giving the middle bend to the link, and holding or clamping the wire while being cut by *f*, and stationary die, *g*, also retaining it until the link is formed; N is a bar moved by cam, D, operating the pinion, M, by striking a stud while the wire is cutting; P is a gauge (operated on by a set screw,) for graduating the pressure of the angular end of the slide bar, O, on the lever, R, in giving the middle bend and grip to the link: Y is a sliding bar for closing the opening, 8, figure 2, through which the wire is fed; it is pressed by the back of the cutter, *f*, which contracts the helical spring, 10, on the shank of Y; this spring re-acts the moment the pressure is removed, and the bar, Y, is forced back, and closes the opening, 8, while the eyes of the link are forming; T T are small, flat springs, having stub bolts or pins working in inclined grooves in the ends of the sleeves or pinions, M and L; they are for the purpose of throwing off the link formed on the mandrels, *c* and *b*. The mandrel, *b*, is the one around which the end of the wire is carried horizontally by the die, *f*, in forming one eye; *c* is the mandrel around which the wire is carried vertically by the bender on the sleeve of L, simultaneously with the formation of the other eye on *b*; G is a cam secured on the side of cam F, and, in its revolutions, operating on lever, I, draws back the rack, H, giving a reverse movement to all the pinions except B, the rod, Y, being moved by the back of the die, *f*, permits the wire to be fed in opening 8.

The operation is as follows:—A wire being introduced in opening 8, and held at a slight angle, is forced against the adjustable stop, 12, passing through a guide near to that side; the angular projection, 4, on lever, R, is brought to bear diagonally on the wire, and, forcing it up between the pins, *c* and *b*, by means of cam, E, operating on bar, O, and forcing the angular projection thereon under the lever, R, raises it, and thus gives the middle bend to the wire, and securely clamping it between the pins, and against the plates. The die, *f*, is now moved by the semi-revolution of pinion, M, acted on by bar, N, and cam, D, and cuts off the wire rod the requisite length for a link, at the same time carrying it horizontally around the pin or mandrel, *b*, while the bender on the sleeve of pinion, L, simultaneously carries the other end round the pin, *c*; L receiving its motion from the miter wheel under K, said wheel being actuated by the sliding rack, H, and cam, F, and completes the link. The springs, T T, are now forced outwards by the pins working in inclined grooves on the ends of the sleeves, and thus slide the eyes off the pins or mandrels, *c* and *b*, and the link drops from the machine ready for joining, which may be done by closing the eyes by hand, but much more perfectly by machinery.

This machine, now in operation at Columbus, Ohio, makes about sixty links per minute, or fifteen hundred pounds per day, and bends them ready for use.

LARGE APPLES.—Thomas Pritchard, Esq., of this city, has shown us the finest specimens of apples we have ever seen in any country; many of them measured fifteen and sixteen inches in circumference, and weighed twenty-eight and twenty-nine ounces. Fifteen or sixteen fill a half-bushel measure. These apples were raised by Nathan Robinson of this county, on trees only three years' growth.—*Oregonian.*

MACHINE FOR CHOPPING BRUSH.

A CORRESPONDENT of the *New-England Farmer* gives the following account of an invention of Mr. Daniels, of Vermont, (of Woodstock, we suppose, the inventor of one of the best of hay-cutters,) which he saw in operation on the farm of Col. Stanley, of Methuen. We do not quite comprehend its form, but its efficiency seems very evident. The writer says:

MESSRS. EDITORS: In passing through Methuen, a few weeks since, I had occasion to call on Col. Charles E. Stanley, of that town, when I was shown by that gentleman a machine, or rather, cutter, belonging to him, to which horse-power is applied, for the purpose of cutting limbs and brush at the door. It is called "Daniel's Patent," of Vermont, being very much on the principle of some hay-cutters, only on a much larger scale. Two huge knives, about eighteen inches long, one-half inch thick, and four and a half in width, are strongly fastened on the shaft roll. A good feed roll is also applied. Hard wood limbs, without trimming, that are not more than three inches, or pine that are not more than four and one-half inches through at the butt, are cut with ease. By changing the gearing, they can be cut any length desired, from four and one-half to one fourth of an inch in length. When green pine limbs are cut two inches long and spread upon a floor not more than ten inches in depth, they will dry so as to burn well in a week.

Col. Stanley says he can cut limbs and brush to the above degree of fineness faster than a smart man, with a good yoke of oxen, can haul and dump them from one-fourth of a mile distant. The advantage of cutting it so fine is, that it brings much scraggy and otherwise worthless brush, up to more than the value of its weight in solid wood, which, in these times of scarcity and high prices of fuel, is an object of too much importance to be overlooked. Col. Stanley's neighbors bring brush to him to be cut on equal shares. As near as I could judge, the machine will do the work of forty men.

The reason that the chips dry so quick, is, that they are not cut square off, but obliquely, one side being concave, and the other convex; consequently they are shattered to such a degree, that the air is admitted entirely through them, and the drying process imediately commences. ******

Danvers, Jan. 16, 1855.

MISCELLANEOUS.

THE ORANGE WATER-MELON.—Mr. Peabody, editor of the *Soil of the South*, Columbus, Ga., has lately introduced a new kind of water-melon, and which, from its singular properties, he calls the orange water-melon. By cutting the rind, as you peel an orange, the entire skin may be taken off, leaving the pulp unbroken, which, with a little care, may be divided as you would an orange. The flavor is said to be very fine, and it has proved itself perfectly hardy in this State. Mr. P. will, on receipt of a dollar, forward pre-paid packages of the seed.

GAS LIME.—Who has tried gas lime as a manure, and what was the result? An answer to the above would be of service to many persons. Who of our agricultural chemists can give its virtues, and the method of using it?

ILLINOIS.—Inexhaustible coal mines are found in the south part of the State. Also lead, porcelain-clay, white and gray marble, saltpetre, salt marshes, Epsom salts, and pure alum. Shortly the Illinois Central Railroad, a continuous line of 440 miles, will connect this region with Galena.

A fine quarry of slate is being opened half a mile from the Railroad Depot in Northfield, upon the Land of B. F. Woodworth. It is very accessible, and, we doubt not, of excellent quality for roofing. Some think, from the dip and range, that it belongs to the same quarry with the slate west of the mountain. Who knows the riches of our State?

STEAM GUN IN ENGLAND.—A London correspondent of the *New-York Spirit of the Times* says, that among the many interesting experiments that are daily performed in England, is Perkins' Steam Gun, which just now is attracting great attention. The gun is fixed, and the experiments are made, driving out balls at the rate of 300 to 400 a minute. Mr. Perkins has offered to the English Government to erect a single steam gun that shall take Sebastopol, or any other Russian stronghold, at a distance of five miles. He proposes to send a ball of one ton weight that distance, and with much greater effect than with powder at one-fifth that distance. It is in contemplation, I believe, by government, to give orders for the manufacture of this gun, in order that the experiments may be tried.

EARTHQUAKES AND ELECTRICITY.—The *Boston Traveller* says, that during the forenoon of the 8th instant, when shocks of earthquakes were felt in Maine, New-Brunswick avd Nova Scotia, telegraphic lines in different sections of the country were more or less disturbed by extraneous electric currents, similar to those that uniformly accompany manifestations of the Aurora Borealis; but the disturbance was slight, compared with that which accompanied the eruption of Manna Loa, a volcano on one of the Sandwich Islands, in February, 1852, at which time every telegraph line throughout the country, from Halifax to New-Orleans, and from New-York to St. Louis, was rendered completely inoperative.

IMPROVEMENTS IN PUDDLING IRON.—James Nasmyth, of Patricroft, near Manchester, England, has recently patented an improved operation in iron manufacture, by subjecting the molten metal in the puddling or refining furnace to the action of a current of steam, introduced at its lower portion, diffusing upwards, and thus mechanically agitating the liquid metal, and exposing fresh surface to the oxygen of the furnace atmosphere, which chemically combines with the carbon and sulphur contained in the iron, and deprives it of those impurities. The hydrogen set free is thus in a state to combine with any excess of sulphur, whether present in the iron, or as a product of the combustion of the fuel.—*Mining Journal.*

DURHAM CATTLE FOR SALE.—James W Pearse, of Lancaster, is now in Marion county, with a lot of superior Short-horn Cattle for sale. Several of them took premiums at the recent Fairfield show, and several of the best breeders of that region certify as to their purity of blood and fine points.

We see by the Zanesville papers that Jones, of the "Stacey House," purchased of Mr. Pearse a thorough-bred heifer; and Thos. Hall, of Wayne Township, Muskingum county, another. Mr. Pearse will be recognized as the owner of the celebrated "*Clay Trustee*," and also "*Prince Hal.*"

Sizes of Shoes.—The *Lynn Directory*, for 1851, says a *size* is the length of one "barley-corn," or one-third of an inch. A size stick is thus formed: Take a rule or piece of pine-wood, thirteen inches in length, and divide it into thirty-nine equal parts of one-third of an inch each. The first thirteen are left blank, and counted nothing. The second thirteen are called men's and women's sizes; each marked from one to thirteen. Thus, nine inches is a man's size, No. 1; ten inches is No. 4; eleven inches, No. 7; twelve inches, No. 10.

The Great Bell of Vienna weighs 34,400 pounds, and a small family could live conveniently under the immense structure. Eight men are required to ring it, as the clapper alone weighs 1,400 pounds. In the room with the clock is stationed a man to watch for the breaking out of fires in the city and suburbs. He takes the angle by means of a fine telescope, and on a chart, prepared for the purpose, finds the street and house; and the alarm is then given.

Gold Mines.—The *Petersburg Intelligencer* gives a list embracing fifteen of the most important gold mines of the State, the aggregate value of which is estimated at $1,700,000. Of these, five are not worked for want of capital, and four, valued at $575,000, are owned by English companies. The great drawback of gold mining in Virginia is the want of adequate machinery—or, in other words, the mines are not rich enough to be profitably worked by the ordinary methods.

Deformed Roots.—English farmers are much troubled with deformed roots, in their culture of carrots, parsnips, and other root crops. They form what are called fingers and toes, instead of the conical and regular shapes usual in successful root-growing. On a large scale this becomes a serious evil. A great amount of discussion has been had in their papers as to the cause of this difficulty, and the remedy for it.

A late writer in the *Agricultural Gazette* states that the difficulty is in the seed-growing, and not in the root culture. His remedy is to cut out the central umbel, in seed-growing, and thus distribute the sap into the lateral ones, when a healthy seed is produced. In this way, "fingers and toes" never disturb him. In using the seed of the central and large umbels, he always gets the deformed roots.—*Prairie Farmer.*

Tradesmen and Laborers.—If any of our readers can furnish employment for good workmen in any branch of industry, we shall be glad to send to them men who are well recommended. Hundreds of good men are still unemployed.

The Sketch of E. B. Bigelow, Esq.—The Biographical sketch of this gentlemen, found in this number, is taken, with consent of the author, Nehemiah Cleveland, Esq., from the pages of the *Merchants' Magazine.*

Tennessee.—The coal mines at the Bluffs, seventy-five miles from Memphis, (recently discovered) yield the best quality of coal, and are apparently inexhaustible.

NEW ENGLISH PATENTS.

MINING ENGINES AND MACHINERY. A BARCLAY, Kilmarnock. *Patent dated March* 2, 1854.—A portion of the improvements comprehended in this patent relate to the so arranging the winding engines of coal and other mines, that they may be more safely managed than at present, whilst all chance of "over-winding" and injury to the mining mechanism may be avoided. These improvements are effected by adapting the ordinary and well-known "link motion" to the hand-gear of the engine, so that the attendant can easily stop and reverse his engine at the exact moment required in the action of winding. To do this, the engine-man has only to work a hand-lever up or down; and this lever being suitably connected with the "link-motion," correspondingly affects the portion of such motion, and thereby either stops or reverses the engine, as is at present done in locomotive and marine engines. By such a system of gearing, the motion is entirely unbroken, and the attendant has always a safe and perfect command over his engine; and to add still further to the safe working of the system, a self-acting movement is contrived to come into play at the precise moment required, for the purpose of stopping or reversing the engine, in case the engine-man should be careless or absent at the proper time. For this purpose a tumbler is so connnected with the engine or winding mechanism, that it shall be slowly wound up, or elevated to its falling centre, at the time that the motion of the engine is to be changed. Thus, as this tumbler falls over, it acts through suitable connections upon the reversing or stopping-link, and effects the intended movement. Various means may be adopted for securing the self-acting effect, disengaging pins or stops being so set as to actuate the link-movement at the proper time.

As adapted to direct-acting horizontal cylinder winding and pumping engines, for instance a small shaft passes away back from the main-shaft to the steam-cylinder, at which end this small shaft carries a worm in gear with a worm-wheel set on a horizontal stud. This wheel has a ring-groove in its side to receive adjustable stud-pins, which are set at the proper distances in the wheel, so as to act upon the adjusting lever of the valve-link motion. Provision is also made, by a separate adjusting slide or bolt, for allowing the engine-man to set the engine to go constantly in one direction, as when used for pumping. When so set, the adjustable-pins of the worm wheel no longer affect the engine, so as to set the valves for back or forward actions, or the up and down winding. Should the engine accidently run slightly beyond the intended point, an eccentric piece on the stud-spindle carrying the worm-wheel acts upon a sliding piece carried round by the wheel, and this movement, acting upon the under side of the valve-link lever, sets this lever to its central position, so as to prevent the return of the engine. These gearing details are obviously capable of being modified in various ways, and the arrangements are suitable for beam or other kinds of engines. To prevent accidents from the main gearing getting disengaged, a friction-brake apparatus is provided, to stop the engine's movement. Thus, should the wheels fly out of gear—owing, for instance, to the attendant's leaving out the fastening-key when changing from pumping to winding—this friction-strap will be brought into play to prevent the engine from running away. The brake-pulley is set upon the shaft, which is liable to slip back, and being loosely encircled by a friction-strap, the lateral traverse, owing to the disengage-

ment, makes the pulley press itself hard against the interior of the strap. This strap encircles three fourths of the wheel, and is workable as well from both its ends. These two opposite ends are each connected to one of the two opposite cages, that is, the ascending and descending cages. For instance, when one of the cages arrives at its proper stopping point, it acts upon a pin or stop in connection with one end of the friction-strap, and draws the strap tight around the pulley in the direction of the revolution of the pulley at the time being. Hence, whichever way the engine is running, the friction-strap has a tendency to be forced down into frictional contact by the pully movement when once started. The engine-man can also work such friction-brake by a separate hand or foot-gear movement.

Revolver Fire-Arms. J. H. Johnson, 47 Lincoln's Inn Fields, and Glasgow.—The invention of M. Lefaucheux, of Paris, which is the subject of this patent, relates to the class of fire-arms termed "revolvers," and consists chiefly of an improved construction of revolving chamber cylinder, and of a new arrangement of breech, to facilitate the loading of the weapon. The revolving piece is a cylinder, with six or any other convenient number of cylindrical or slightly conical holes bored through it, to form the charge-chambers. An additional hole is bored centrally through the cylinder, for the passage of the spindle upon which it turns, and to which the barrel of the weapon is attached. The charge-chambers are each notched through to the outside of the cylinder at their back edges, to suit the particular description of cartridge employed, this cartridge being made up with the percussion appliance attached in such a manner as to enter and project through the notch of the charge-chamber. The breech of the weapon is hemispherical in shape, and is formed with a vertical groove, in which the hammer works, the hammer rising up centrally from the stock. The face of the breech-piece is perfectly smooth and flat, as is also the end of the charge-cylinder in contact with it. A channel is formed in the breech on one side, through which the cartridges are introduced into the charge-chambers as these are brought round in succession, and a filling-up piece is hinged to the breech to close the channel when the chambers are not being charged, a spring-catch being provided to keep the filling-up piece closed when necessary. In a slide, on one side of the barrel, and in a line with the charging-channel in the breech-piece, is a rod for forcing out the cartridges, if required, without exploding them, or for removing any matter left in the charge-chambers after a discharge. This rod is prevented, by a blade spring, from falling out or moving, unless the hand is applied. The rotation of the charge-cylinder is effected in the usual way, by the action of a catch in connection with the hammer, upon a ratchet formed upon the cylinder, and the cylinder is retained accurately in position during each discharge by means of a catch, also acted upon by the hammer, and made to enter a notch in the cylinder-face after each rotative movement.

Journal Bearings. A. Barclay, Kilmarnock.—With a view of economizing the oil used in lubricating the journal bearings of horizontal shafts, by enabling it to be repeatedly reüsed, Mr. Barclay has designed the improvements forming the subject of the present patent, and which, by preventing the too rapid escape of the lubricating oil from between the rubbing surfaces, also renders the lubrication of the shaft much more efficient. In carrying out this invention, according to one modification, the shaft is formed with a projecting collar upon it, of the length of the intended bearing, and the brasses are

formed to suit this modification. Each brass extends considerably past each edge of the collar, and is slightly turned out or recessed, so that the angles of the collar shall be slightly overlapped by the brass. Beyond this overlap on each side, the extension of the brass is hollowed out internally, to form an annular cup for the reception of oil, and these edge-cup pieces are well overhung, and brought close to the plain part of the shaft to prevent the entry of dirt. The inner face of the upper brass is inclined upwards from each side towards the centre, instead of being square across as usual; and the result is, that the oil supplied from the top, in the usual way, is well spread over the frictional surfaces, and, flowing down, it is caught by the annular cups of the brasses, and retained therein for continued use; or the same effect may be obtained by beveling the inner edge or edges of the inner brass alone, the upper brass being made square across, as usual. The continued use of the oil is effected by the action of the bearing collar on the shaft, for, as this revolves, its edges gather films of oil from the annular cups, and bring up the oil so collected to the top brass. Here the revolving collar edges apply the oil to the corresponding edges of the upper brass, and, owing to the duplex interior incline thereon, the oil is thence conveyed towards the centre of the bearing, whence it is well distributed over the whole rubbing surfaces. Instead of a plain collar projection, other forms of journals may be employed with the same result, or a couple of rings may be set fast on the shaft, so as to carry up the oil in a similar manner.

NEW MUSIC.—WM. HALL & SON.—We would again remind our readers of the fine opportunity now offered of buying music very cheaply. Among the publications offered at reduced prices, we present the following reprints, and new pieces, with the reduced prices: Leonora, a polka; Indiana, a brilliant waltz; Olga Mazurka, by A. Goria; "I Wandered on the Sea-beat Shore," by J. W. Cherry; "Cheer, Boys, Cheer," by Henry Russell, each of which contains five pages, and each is sold at fifteen cents. "Swinging, Swinging, All Day Long;" or, Song of the Old Hall Clock, is a very pretty solo and chorus, by Wurtzel, copyright, at twenty-five cents, nett, five pages.

GENERAL AGENCY.—The publisher of *The Plough, the Loom, and the Anvil*, believing it in his power to be of essential service to the readers of that journal, in the purchase or sale of various articles, and the transaction of various kinds of business, would announce to them that he is ready to execute any such commission which he may receive, including the purchase of books of any description; implements connected with agricultural, manufacturing, or mechanical operations; artificial manures; farm and garden seeds, etc., etc. One of the gentlemen connected with the journal is a proficient in music, and experienced in the selection of piano-fortes, flutes, etc., and will execute orders in that department.

He will also act as agent in the purchase and sale of Real Estate.

☞Particular attention to business connected with the Patent-Office.

Letters of inquiry on these matters will be promptly attended to.

SCHOOL-TEACHERS. — Having had occasion to furnish teachers for some of our Southern friends, we have been fortunate enough to learn of several young ladies who are admirably well qualified for families or schools, and if any are in need of such, a letter addressed to us will receive immediate answer. We shall not fear to guarantee that any reasonable expectations will be fully met. Some of them are desirous of going South.

List of Patents Issued

FROM JAN. 2, TO FEB. 6, 1855

Thos. H. Barlow, Lexington, improvement in fire-arms.

Jarvis Case, Springfield, Ohio, improvement in seed-planters.

John S. Barden, New-Haven, for water metre.

Jotham S. Conant, New-York, improvement in sewing machines.

Wm. C. Hooper, of Pittsburgh, for bench plane.

Edward H. Graham, Biddeford, Me., improvement in fire-arms.

John H. Allen, Bidleford, Me., improvement in temples for looms.

John S. Addison, New-York, improved gold washer and amalgamator.

Alfred C. Carratt, Hanover, Mass., improvements in plugs for lubricating axles.

Michael D. Dyott, Philadelphia, improvement in lamp shades.

John C. Kline, Pittsburgh, improvement in door-latch locks.

Arnton Smith, Macoupin county, Ill., improvement in plows.

Samuel H. Robinson, Baltimore, improvement in lime kilns.

Geo. M. Ramsey, Newark, for moulding machine.

Alonzo D. Perry, Newark, improvement in fire-arms.

Lucius Paige, Cavendish, Vt., improvement in brake blocks for railroad cars.

Jno. L. McPherson, New Vienna, O., improvement in scale.

Hezekiah B. Smith, Lowell, improvement in sewing machine.

C. B. Morse, Rhinebeck, for moulding machine.

Elisha P. Beckwith, New-London, improvement in spring balances.

Abijah R. Tewksbury, Boston, for improved steering apparatus.

Parley Hutchins, Norwich, Mass., improved handtruck.

O. B. Judd. Little Falls, improvement in grain and grass harvesters.

John A. Pitts, Buffalo, improvement in straw cutters.

R. L. Hawes, Worcester, for machine for making boxes of paper.

Elijah Morgan, Morgantown, Va., improvement in seed planters.

John F. Masscher, Philadelphia, for stereoscopic medallion.

Hezekiah Conant, Hartford, improvement in moulds for casting projectiles.

John Sutton, New-York, lubricator for steam engines.

Stephen L. Stockstill, and Peter H. Humes, Brandt, O., improvement in seed planters.

Gustavus Wissenborn, New-York, improved arrangement of filtering apparatus to prevent incrustation in steam boilers.

John T. Willmarth, Northbridge, Mass, improved dies for making bolts.

Wendell Wright, New-York, improvement in mode of connecting pipes for steam boilers.

Ambrose Foster, Portland, Wisconsin, and Elizabeth A. Messinger, administratrix, and Wm. Spencer, administrator of John A. Messinger, deceased, of Milwaukie, Wisconsin, assignors through said administratrix, and administrator to Ambrose Foster, aforesaid, improved building block.

Wm. Leighton, Cambridge, Mass., assignor to the New-England Glass Company, of same place, improvements in door knobs.

Wm. M. Bonwill, Camden, Del., improvement in hernial trusses.

Wm. Shaw, Boston, improved gas heater.

Solomon G. Booth, New-York, improvement in rollers for corrugating sheet metal.

George A. Brown, Middletown, R. I., for hay-making machine.

Henry J. Bruner, Nazareth, for improved instrument for cutting out stone.

Dexter A. Chamberlain, and John Hartshorn, Boston, improvement in rollers for curtains.

George R. Comstock, Manheim, New-York, improvement in carriage seats.

George R. Comstock, Manheim, New-York, improvement in carriage seats.

George R. Comstock, Manheim, New-York, improvement in carriages.

James Eccles, Philadelphia, improvement in looms.

Henry A. Frost, Worcester, improvement in means for holding window-blinds.

Louis Francis Groebl, Philadelphia, for improved marquetry.

Michael Greenbaum, Chicago, for improved hot air furnaces.

Wm. H. Harn, Carlisle, Pa., improved mill for cutting and grinding vegetables.

Wm. Ives, Buffalo, for book brace.

Samuel G. Jones, Fitzwater Town, Pa., improvement in lifting jacks.

Charles Mettam, New-York, improvement in rolling iron shutters.

Daniel Newton, Southamton, Conn., improvement in metal folding machines.

Horace W. Peaslee, Maiden Bridge, New-York, improvement in machine for washing paper stock. Patented in England, September 20, 1854.

Albert W. Roberts, Hartford, Conn., improvement in fire engines.

E. K. Root, Hartford, for improved compound rifling machines.

Eloy Schmitz, New-York, for improved apparatus for supplying furnaces with pulverized metal.

R. P. Benton, Rochester, improvement in feeding mortising machines.

Isaac J. Cole, Clermont, for improved compound crowbar.

Abel W. Streeter, Shelburne Falls, Mass., improvement in fastening centre bits.

John Sutton, New-York, for lubrication of steam machinery

Lewis Hoover, Jersey City, improvement in lanterns.

Henry Blakeley, New-York, improvement in iron window blinds.

Geo. Copeland, Lewiston, Me., improvement in looms.

Isaac Williams, and Isaac W. Bausman, Alleghany county, Pa., improvement in cotton seed planters.

Samuel Huffman, Charleston, Illinois, assignor to himself and Dennis O'Hara, Washington, D. C., improvement in repeating cannon.

Edmond Morris, Burlington, N. J., improvement in buckets for chain pumps.

Leopold and Joseph Thomas, Alleghany City, for match machine.

John U. Wallis, Dansville, New-York, improvement in paddle wheels.

Geo. F. Wood, Ulysses, New-York, improvement in oscillating engines.

John M. Bull, Sidney, O., improvement in hand-rails for stairs.

Newell A. Prince, Brooklyn, improved fountain pen.

I. J. W. Adams, Sharptown, Md., improved implements for boring wells.

Wm. Adamson, Philadelphia, improvement in clarifying glue.

Abel H. Bartlett, Kings Bridge, for hot air furnace.

B. F. Rabbitt, New-York, for car ventilator.

John Blackwood, Franklin Co., Ohio, improvement in seed planters.

Jacob Brown, Lawn Bridge, Ill., improvement in seed planters.

Dexter H. Chamberlain, and John Hartshorn, Boston, fountain brush.

Alfred Doe, Concord, improvement in plows.

Jas. Eaton, Townsend Harbor, Mass., improvement in dies for cap-tube machines.

George Fowler, Northford, Ct., for double-acting force pump.

Hezekiah Griswold, Hartford, improvement in the yoke of shirts.

Jonathan Hibbs, Tullytown, Pa., improvement in clover hullers.

Alex. Hall, Lloydsville, Ohio, improvement in piano fortes.

John Hobbs, Hallowell, improvement in rain staff screws for ship carpenters.

Washburn Race, and Birdsill Holly, Seneca Falls, improvement in carriage wheels.

R. Jennings, Deep River, Ct., improvement in augers.

Wm. H. McNamee, Philadelphia, improvement in locking spindle door latches.

Sidney S. Middlebrook, Jas. R. Blakslee, and Charles F. Blakslee, Newton, Ct., improvement in machinery for felting hat bodies.

J. B. Nichols, Lynn, improvement in sewing machines.

Aaron Palmer, Brockport, improvement in the construction of the frame of grass harvesters.

Elijah F. Parker, Proctorsville, Vt., improvement in lantern frames.

Jesse Reed, Marshfield, improvement in cable stoppers.

Henry Rogers, Ferrisburgh, Vt., improved force-pump.

David Russell, Drewersburg, Ind., improvement in harvester cutters.

Alex. O. H. P. Schorn, Murfreesboro, Tenn., improvement in portable fire-arms.

Thaddeus Selleck, Greenwich, Ct., improvement in methods of working Franklinite ore.

John Skelley, Brooklyn, improvement in carriage wheels.

Geo. L. Squir, Chicopee Falls, improvement in straw cutters.

Joseph Stockdale, Ypsilanti, improvement in cultivator teeth.

Jonathan G. Trotter, Newark, N. J., improvement in the construction of furnaces for zinc white.

Henry G. Tyler, and John Helm, New-Brunswick, N. J., improvement in processes for making india-rubber cloth.

Elisha Waters, Troy, improvement in cylindrical boxes.

Salem Wilder, Lynn, improvement in waxing thread in sewing machines.

Pinney Youngs, Milwaukie, Wis., improvement in sewing machines.

James S. Ewbank, New-York, assignor to Wm. Everdell, Jr., of same place, improvement in spurs.

Edwin A. Morrison, Lawrenceville, Va., assignor to himself and Robt. J. Morrison, Richmond, Va., improvement in delivering apparatus of grain harvesters.

George A. Meacham, New-York, for window washer.

John Bean, and Benj. Wright, Hudson, Mich., improvement in smut machines.

W. C. & J. S. Burnham, New-York, improvements in double-acting force-pumps.

John H. Bloodgood, New-York, improvement in manufacturing seamless felt goods.

David N. B. Coffin, Jr., Lynn, improved daguerreotype holder.

Nelson B. Carpenter, and John Powers, New-York, improved lifting jacks for moving rail bars.

Richard Deering, Sr., Louisville, for current water-wheels.

Geo. W. Geisendorff, Indianapolis, and Jacob C. Geisendorff, Cincinnati, O., improvement in axle box rollers.

John S. Griffiths, Huntington, Pa., improved corn and cob crusher.

F. B. Bant, and Ellis Nordyke, Richmond, Ind., improved wire cloth bolt.

Birdsill Holly, Seneca Falls, improvement in elliptical rotary pump.

Daniel Haldeman, Morgantown, Va., improved burglar's alarm.

Alpheus Kimball, Fitchburg, Mass., improved machine for repairing roads.

S. E. Pettee, Foxborough, Mass., improvement in pressing hats and bonnets.

Robt. A. Smith, and John Hartman, Jr., Philadelphia, improved street-sweeping machine.

Wm. Mt. Storm, New-York, improvement in steam generators.

Joel Weigle, Swan Station, Pa., improved crushing and grinding mill.

Wm. B. Carpenter, New-York, improvement in the combined chair and crib for children.

John Cochrane, Baltimore, improvement in locomotive trucks.

V. P. Corbet, Corbetsville, New-York, improvement in constructing ships and other vessels.

Thomas Champion, Washington, improvement in making steam boilers.

Henry Glynn, Baltimore, improvement in manufacture of paper pulp.

James A. Gray, Albany, improved sounding-board for piano fortes.

James H. Maycole, and Albert W. Morse, Eaton, N. Y., improvement in grass harvesters.

Isaac M. Singer, New-York, improvement in sewing machines.

James A. Taylor, Alden, New-York, improvement in mop-heads.

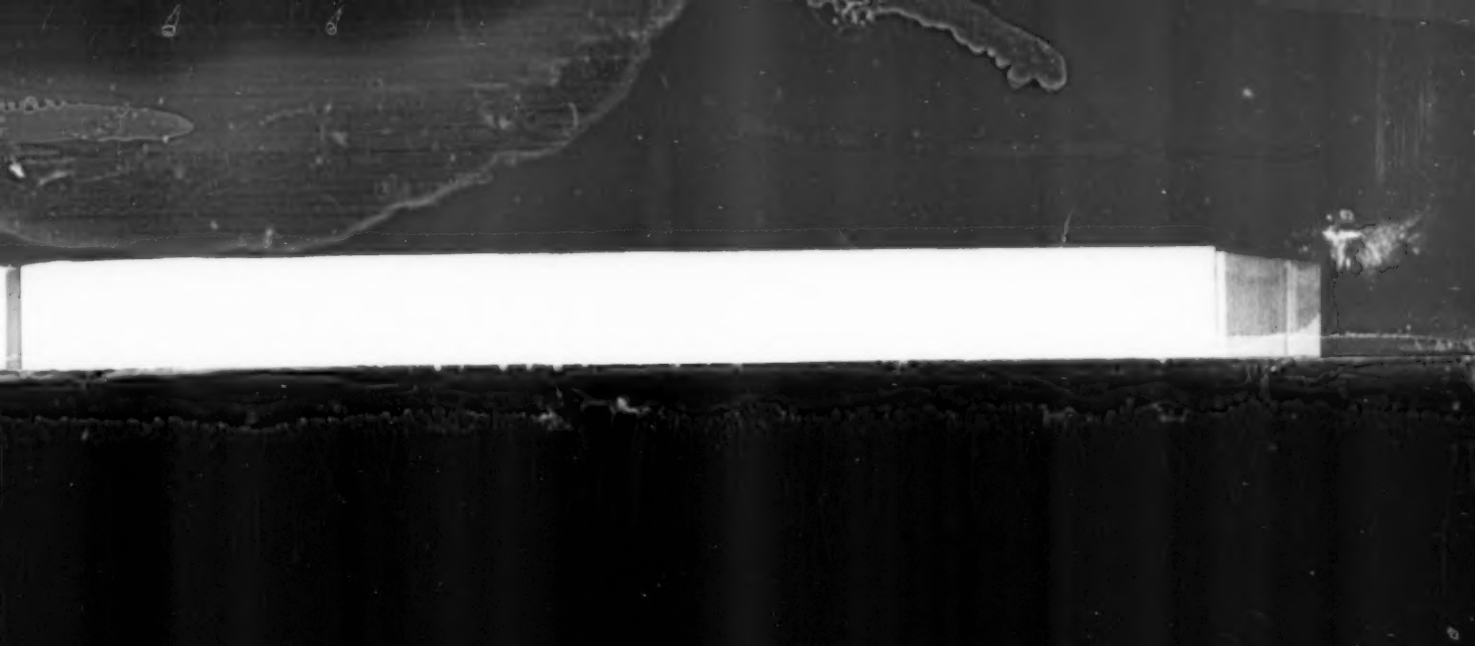
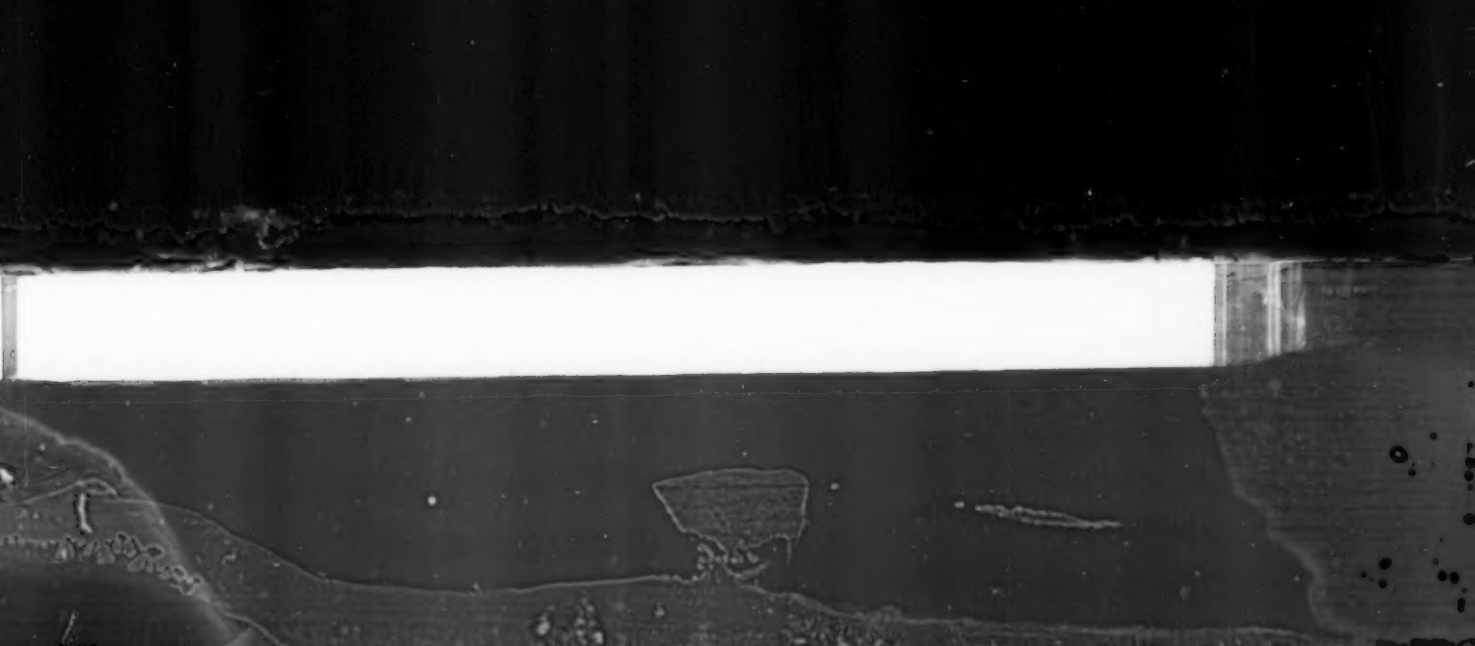
Isaiah M. Williams, Blanchester, O., improvement in butter workers.

Cyrenus Wheeler, Jr., Venice, New-York, improvement in grain and grass harvesters.

L. W. Fiske, Louisville, improvement in compositions for bleaching and stuffing leather.

L. W. Fiske, Louisville, improvement in working lime vats and tanneries.

Hazen Webster, Ogdensburg, improvement in churns.

Geo. B. Ketcham, Bedford, Ind., improvement in mechanism for retaining cars upon the track.

J. G. McFarlane, Perry Co., Pa., improvement n seed planters. Patented, March 14, 1854.